Phelsuma

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Contents

EDITORIAL

When we started publishing *Phelsuma* the journal was intended to cover the entire western Indian Ocean. Over the years coverage has expanded from a narrow focus on Seychelles to include the Chagos, Comores and Mauritius. The biggest gap was Madagascar and this 9th issue sees our first paper from that fascinating island. With our expanding coverage we are now established as a major journal in the region, accordingly our distribution continues to expand steadily at some 10% per year.

The continued success of *Phelsuma* depends upon two main factors: sustained interest in the region and continued research on these islands. With the western Indian Ocean being recognised internationally as a biodiversity hotspot sustained interest in the region would seem assured, for those of us working on the smaller islands there is a major challenge to convince the world that all the islands are of great importance, and not just Madagscar. The continuance of research in the region seems more questionable. There has been very little research output from several of the islands, but others have a long history of research (again, dominated by Madagascar). Within Seychelles research has been very localised, with papers on a small handful of islands being produced regularly and other islands remaining completely unknown. Examination of the Seychelles papers listed in *Phelsuma* over the last 5 years indicates that there has been a signficant decline in publication. This is most obvious for research carried out on Aldabra but is true for all the islands. As a result of this change *Phelsuma* will now start listing published notes as well as full papers; in the past the volume of research papers from Seychelles was too great to make this practical.

It has always been the aim of NPTS and the editorial policy of *Phelsuma* to encourage research and publication in the western Indian Ocean. Without the encouragement of research and, much more importantly, publication, it is difficult to plan conservation and development sustainably or to raise the profile of the region. Madagascar and Aldabra have done well in this regard in the past and to a very large extent the other islands have been carried forward by the researchers in those locations. *Phelsuma* is dedicated to encouraging publications from all the islands of our exceptional region.

Modifications to the lay-out of *Phelsuma* continue to be made. In this issue most NPTS reports have been removed and incorporated into the chairman's report. The exceptions to this are the reports on the Seychelles Terrapin Project and the Fregate Island Invertebrates, both of which have substantial news worth reporting in full. This change allows more space to be dedicated to research papers and notes.

J. Gerlach
Editor

CHAIRMAN'S REPORT

This past year has been devoted to our growing commitments on Silhouette and the demands of the giant tortoise and terrapin breeding projects. With the boost given to visitor appreciation of the natural history of this fascinating island by our Information Centre, we have been able to attract more nature tourists and specialist groups to Silhouette. The impact of tourism however remains negligible as day visitors are generally confined to the environs of the settlement and other visitors are taken on guided walks along well-established trails. With the help of the Islands Development Company (who manage Silhouette) we have started a trail maintenance routine to ensure the safety and good state of the trails.

This year we have started work on a pilot project to restore an area of lowland forest on Silhouette. This area is bounded by the Anse Lascars trail on one side and the granite base of Mont Poules Marrones on the other. By removing alien plants and coconut scrub, natural forest regrowth is encouraged. The forest diversity is increased by replanting lowland species that were once cleared from the area and do not therefore have a nearby seed source. In this area we have planted out our first *Rothmannia annae* seedling - a plant that had disappeared from most islands but which survived on Aride. In collaboration with Aride Island and the Botanical Gardens, we are attempting to re-establish these trees on Silhouette.

The Seychelles Giant Tortoise Conservation Project has kept us in suspense all year. The first clutch of eggs for the season was laid by *Dipsochelys hololissa* Josephine on 10th July 2000. Alida, our newest *Dipsochelys arnoldi* then proceeded to produce 7 clutches over the next 8 months, totalling 99 eggs. Despite 4 different incubation methods, including leaving some eggs in the natural nests, none seem to be fertile.

We have had far more success with our Seychelles Terrapin Conservation Project. This year has seen the successful hatching of 9 *Pelusios subniger*. We have also had a first ever partial clutch (3 eggs) from the *Pelusios castanoides* but these were unfortunately damaged. The tortoise and terrapin projects benefited greatly this year when they were chosen as suitable projects for sponsorship by the Africa Travel and Tourism Association at a charity dinner at the World Travel Fair in London. Sponsorship of a large new aquarium for terrapin hatchlings, pumping equipment for the outdoor ponds and a secure outdoor enclosure for tortoise hatchlings were proposed and accepted.

We also received assistance from Mr. Peter Kistler whose company runs a conservation support initiative called SAN, in Switzerland. The tortoise project was the main beneficiary with funding for soil humidity instruments but some funds also went towards the cost of printing our publications.

We are very grateful to the following organisations and individuals for their support this year. This encouragement makes everything we do worthwhile.

Islands Development Company	Premises and Logistic support
Africa Travel & Tourism Association	Tortoise and Terrapin projects funding
Peter Kistler (SAN)	Tortoise project and equipment funding
Mr. William Patrick Watson	Donation
KPMG Pool and Patel	For acting as our Honorary Auditors
Mr. Desmond Dauban	Donation
Rolf C. Hagen Inc.	Terrapin food
Mr. Guy van Heygen	Terrapin food
	(also good coffee and Belgian chocolates!)

Very many thanks to you all. Thank you also to the many kind people who have made smaller but equally important donations during the year.

As usual, we have had a number of dedicated people who, at their own expense, have acted as volunteers for us during the year. We should like to thank Richard Pitman, Johanna Willi, Anita Linsell, Dave Simpson and Audrey Royo. Thank you also, to the group of local volunteers from Takamaka district who helped with the lowland forest restoration project.

R. Gerlach
Chairman

SEYCHELLES TERRAPIN CONSERVATION PROJECT

The project has now been running for three years. The aim is to understand the breeding requirements of both species and to breed them for re-introductions to secure wetland habitats. These secure habitats on the various granitic islands still need to be established and restocked before the "critically endangered" status of these species can be down-graded.

Project infrastructure

At the start of the project, two ponds were built using pond-liners with one third of each pond covered with wooden planks to provide shade. Two males and three females of *Pelusios castanoides* were placed in one pond and two males and three females of *Pelusios subniger* in the second pond.

Despite locating the ponds in open shade, difficulty in maintaining water quality was a continual problem. In 2000 with funding from the United States Embassy, the enclosures were entirely rebuilt and new ponds installed. The new enclosure is 6m x 6m. with a low galvanised square mesh security fence to prevent the terrapins escaping or entering the other ponds. This is enveloped in a 1.80 m. high chain-link fence and the whole enclosure covered with a heavy gauge shade cloth.

Initially, three ponds were constructed from 25 mm.marine plywood and sealed with fibre glass resin. Two tanks are 2x1.20x0.60m deep and the third 1.20x1.20x0.60m deep. A fourth pond made of plastic pondliner was built.

Each pond is fenced off from the other and is equipped with a pump to ensure water filtration and circulation.

Food

The difficulty of obtaining regular stocks of totally natural food resulted in a decision to use a proprietary brand of terrapin food and to supplement this with natural food items whenever possible. Vegetation that is planted along the edge of the ponds is also consumed. At present the food supply is being sponsored by Rolf. C. Hagen Inc. of Quebec, Canada.

Breeding

Pelusios castanoides

The mixed group of males and females in one pond was realised to be a mistake after the first two seasons. In the year 2000, a male was placed in each of the two ponds. The females were kept with the male in the large pond. One female was removed from the large pond and placed with the male in the small pond. After four weeks she was removed and returned to the large pond. The male in the small pond was left in isolation for four weeks and then a different female was introduced. This continued throughout the year. No matings were observed and no eggs laid.

In 2001, both males were placed in the large pond and all three females in the small pond. One female found wandering on the surface in February was placed with the males for a period of 3 days. She was then returned to the female pond. On 22nd March, 3 eggs were found in the female pond. The females were then separated in the hope that more eggs would be laid, but this did not happen. These eggs were laid in the water and were damaged before discovery.

Pelusios subniger

In the first year of the project, eggs were found in the *Pelusios subniger* pond where 2 males and 3 females were resident. These eggs were mostly damaged or totally water-logged.

In the season early in 1999, some eggs were rescued from the pond and placed in a high-humidity incubator. In order to ensure reasonable air circulation , the incubator lid was left slightly open This reduced humidity and caused some of the eggs to dry enough to develop dents and subsequent fungal attack. One egg, however, continued to develop but was lost to a rat a few days prior to hatching. The hatchling was subsequently found with its yolk sac and head eaten away.

The season in 2000 (between January and April) saw the first successful hatching of a *Pelusios subniger*. Once again the eggs were laid in the water and only one from a clutch of 6 hatched, despite two eggs showing signs of development.

This year, having solved the incubation problems, (eggs half-buried in damp vermiculite in the incubator running at 100% humidity) 9 hatchlings have been produced. The females are however still laying the majority of eggs in the water and a careful watch is kept throughout the season in order to prevent the loss of eggs due to water saturation.

Mating appears to be dominated by the largest male and appears to start in November and continues throughout the laying season.

R. Gerlach

INDIAN OCEAN 2000-2005

A project to assess the biodiversity of the Seychelles and Mauritian islands in commemoration of the centenary of the Percy Sladen Trust Expedition to the Indian Ocean

In July 2001 a Memorandum of Understanding was signed between the Seychelles Government's Ministry of Environment and Transport (MoET) and The Nature Protection Trust of Seychelles (NPTS) covering the management of the Indian Ocean Biodiversity Assessment 2000-2005. It is hoped that with the support and involvement of the MoET it will be possible to raise the funds needed for the implementation of the full project.

The methods selected for the project have now been tested on a range of island sizes and habitats, allowing the approach to collecting to be refined. This testing of methods has provided preliminary data from Silhouette, North, Cousine, Bird, Alphonse, Bijoutier, St. Francois and Fouquet islands.

The Indian Ocean Biodiversity Assessment has been selected as a satellite project of the International Biodiversity Observation Year.

J. Gerlach

FREGATE ISLAND INVERTEBRATES

The Fregate Island Invertebrate Programmme at the Zoological Society of London

Graham Slater, a student from the University College of London, has just completed a three month study on the captive Fregate beetles at London Zoos Invertebrate Conservation Unit for his undergraduate dissertation. Graham was investigating the following;

Beetle activity during night and day, which established these beetles show significant nocturnal behaviour.

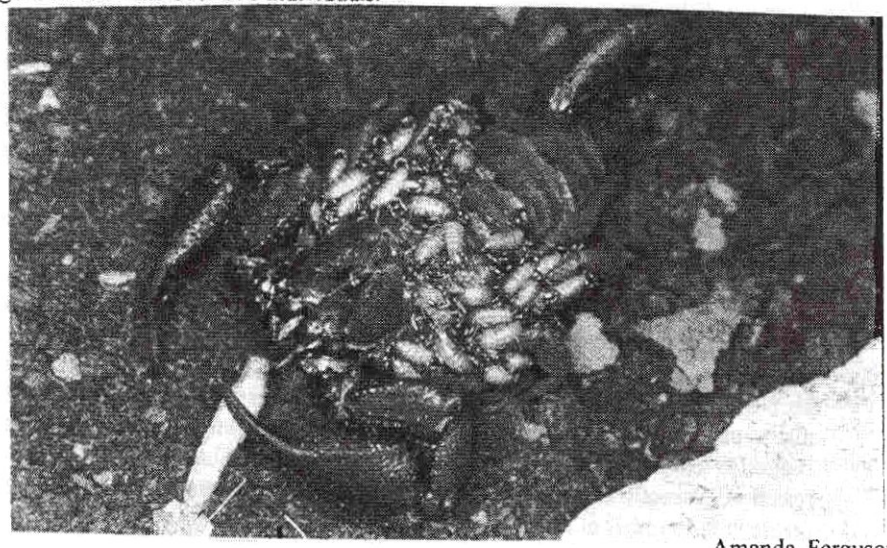
Sexual behaviour, to try to elucidate factors involved in initiating sex and reasons for failure in pairing. Graham analysed the size data from individuals of know sex (from observing matings) and discovered there was no significant difference in size indicating these beetles are not sexually dimorphic. Correlation between male and female size in mating pairs was not significant. Males initiated 72% of mating attempts, but Graham suggested females appear to control mating as 80% of the failures were due to female rejection. Sexually active individuals often had different partners. A significant decrease in the number of matings in the F2 generation was observed.

Graham did a brilliant job and as ever with these investigations even more questions

are raised. We are especially interested in the F2 generation behaviour. As yet no F3 generation individuals have emerged although there has been larvae in the substrate for some time. Another University student will be taking a closer look at this group of animals over the summer.

One pair of scorpions (*Chiromachus ochropus* (Koch, 1838) bred for the first time in 2000. The male and female were 'fed up' first, the female moved to a larger tank then about 2 weeks later the male was introduced on 9th January 2000. Initially there was some aggression, we had to move them apart but left them in together, then the male started courtship which appeared to be a juddering/vibrating movement of his body as he approached the female. Mating was observed a couple of weeks later, with both animals holding pedipalps and the male manouvering the female over the spermotheca. The female gave birth on 10th November 2000. There were at least 80 young produced over a few days, all were pale and clustered together on her back. They stayed on the female for quite a while before moving off to hide under rocks and wood in the tank. The female was removed on 18th February 2001 when all the babies had left her and she was put back with the male. We estimate there are 60 young surviving at the present time. The young scorpions are being kept as a group and have undergone at least one moult. They stay hidden under rocks or bits of wood most of the time. The adults were removed some time ago and have been set up in a new breeding tank now. A second pair of scorpions were put together at the end of February 2000, they mated that evening but so far no young have been produced.

In brief, the other species are all doing well. The enid snails (*Pachnodus fregatensis* Van Mol & Coppois, 1980) breed consistently and are increasing in number. The millipedes (*Seychelleptus seychellarum* (Desjardins, 1834)) collected in 1999 have at least 300 young. The offspring of those collected in 1996 have produced their own young (F2 generation); again we estimate over 300 individuals.



Amanda Ferguson
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1997 PUBLICATIONS

[S = granitic islands, Bird & Denis; Ami = Amirantes; Ald = Aldabra]

R'kha, S., Moreteau, B., Coyne, J.A. & David, J.R. Evolution of a lesser fitness trait: egg production in the specialist *Drosophila sechellia*. *Genet. Res.* **69**; 17-23 [Sey]

1998 PUBLICATIONS

Ambou, M., Moreteau, B. & David, J.R. Larval tolerance in the *Drosophila melanogaster* species complex towards the two toxic acids of the *D. sechellia* host plant. *Hereditas* **129**; 7-14 [Sey]

Ramos, J.A. Nest-site selection by Roseate Terns breeding on Aride Island, Seychelles. *Colonial Waterbirds* **21**; 438-443 [Sey]

Weygoldt, P. Revision of the species of *Phrynichus* Karsch, 1879 and *Euphrynichus* Weygoldt, 1995 (Chelicerata, Amblypygi). *Zoologica, Stuttgart* **147**; 1-65 [Sey]

1999 PUBLICATIONS

Komdeur, J. & Kats, R.K.H. Predation risk affects trade-off between nest guarding and foraging in Seychelles warbler. *Behav. Ecol.* **10**; 648-658 [Sey]

Weygoldt, P. Sperm transfers, spermatophore morphology, and female genitalia of three species of whip spiders: *Charinus seychellarum* Kraepelin, 1898, *Damon medius* (Herbst, 1797), and *Phrynichus scaber* (Gervais, 1844) (Chelicerata, Amblypygi). *Zoologica, Stuttgart* **150**; 47-64 [Sey]

Wilkinson, C., Linden, O., Cesar, H., Hodgson, G., Rubens, J. & Strong, A.E. Ecological and socioeconomic impacts of 1998 coral mortality in the Indian Ocean: an ENSO impact and a warning of future change? *Ambio* **28**; 188-196 [Sey]

2000 PUBLICATIONS

Braithwaite, C.J.R., Montaggi, L.F., Camoin, G.F., Dalmasso, H., Dullo, W.C. & Mangini, A. Origin and development of Holocene coral reefs - a revisited model - based on reef boreholes in the Seychelles, Indian Ocean. *Int. J. E. Sci.* **89**; 431-445 [Sey]

Damgaard, J., Andersen, N.M., Cheng, L. & Sperling, F.A.H. Phylogeny of sea skaters, *Halobates* Eschscholtz (Hemiptera, Gerridae), based on mtDNA sequence and morphology. *Zool. J. Linn. Soc.* **130**; 511-526 [Ami, Ald]

Hodin, J. & Riddiford, L.M. Different mechanisms underlie phenotypic and interspecific variation for a reproductive character in drosophilids (Insecta: Diptera). *Evol.* **54**; 1638-1653 [Sey]

Jarrett, A.G. *Marine Shells of the Seychelles*. Carole Green, Cambridge. 148pp. [Sey, Ami, Ald]

Kitching, I.J. & Cadiou, J.-M. *Hawkmoths of the World*. Cornell UP, USA. [Sey]

Kaplan, M. The pectoral girdles of *Rana rugulosa* (Ranidae) and *Nesomantis thomassetti* (Sooglossidae). *Herpetologica* **56**; 188-195 [Sey]

Kolbasov, G.A. *Lithoglyptes cornutus*, new species (Cirripedia, Acrothoracica), a boring barnacle from the Seychelles, with some data on its ultrastructure. *Hydrobiol.* **438**; 185-191 [Sey]

2000 PUBLICATIONS

Logunov, D.V. A new endemic genus and three new species of the jumping spiders (Araneae: Salticidae) from the Seychelles Islands. *Cimbebasia* **16**; 261-267 [Sey, Ald]

Mortimer, J.A. & Constance, A. Observations on the birds of Cosmoledo Atoll, Seychelles. *Bull. B.O.C.* **120**; 46-57 [Ald]

Ramos, J.A. Characteristics of foraging habitats and chicke food provisioning by tropical Roseate Terns. *Condor* **102**; 795-803 [Sey]

Russell, A.P., Rittenhouse, D.R. & Bauer, A.M. Laryngotracheal morphology of Afro-Madagascan geckos: a comparative survey. *J. Morphol.* **245**; 241-268 [Sey]

Spencer, T., Teleki, K.A., Bradshaw, C. & Spalding, M.D. Coral bleaching in the southern Seychelles during the 1997-1998 indian Ocean warm event. *Mar. Poll. B.* **40**; 569-586 [Ami]

Thorsen, M., Shorten, R., Lucking, R. & Lucking, V. Norway rats (*Rattus norvegicus*) on Fregate Island, Seychelles: the invasion; the subsequent eradication attempts and implications for the island's fauna. *Biol. Conserv.* **96**; 133-138 [Sey]

Tomaru, M., Doi, M., Higuchi, H. & Oguma, Y. Courtship song recognition in the *Drosophila melanogaster* complex: heterospecific songs make females receptive in *D. melanogaster*, but not in *D. sechellia*. *Evol.* **54**; 1286-1294 [Sey]

Veen, T., Richardson, D.S., Blaakmeer, K. & Komdeur, J. Experimental evidence for innate predation recognition in the Seychelles warbler. *Proc. R. Soc. Lond. B.* **267**; 2253-2258 [Sey]

Viles, H.A., Spencer, T., Teleki, K. & Cox., C. Observations on 16 years of microfloral recolonization data from limestone surfaces, Aldabra Atoll, Indian Ocean - Implications for biological weathering. *Earth Surf.* **25**; 1355-1370 [Ald]

Weygoldt, P. *Whip Spiders (Chelicerata: Amblypygi), Their Biology, Morphology and Systematics.* Apollo Books, Stenstrup, Denmark, 160pp. [Sey]

Zahuranec, B.J. Zoogeography and systematics of the lanternfishes of the genus *Nannobrachium* (Myctophidae: Lamparyctini). *Smithson. Cont. Zool.* **607**; 1-69 [Sey]

Pholcid spiders of the granitic Seychelles (Araneae, Pholcidae)

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Abstract: Nine pholcid spiders are recorded from the granitic Seychelles. One genus, *Cenemus* n. gen, and two species *Cenemus silhouette* n. sp. and *Spermophorides lascars* n. sp. are described as new to science.

Key words: Araneae, Pholcidae, Seychelles.

Introduction

The pholcids have elongate or globose abdomens and frequently very long and thin legs with false segments in tarsi. Hence they are often mistaken for daddy longlegs. The overall colouration of the pholcids is quite variable but the legs are usually characteristically annulated; femora with dark and pale apical rings, patellas entirely dark, tibiae with a dark proximal ring and dark and pale apical rings. Eye region frequently more or less elevated bearing eight or six eyes; when present AMEs smallest, others in two triads. Presence of the cheliceral stridulatory organs variable (Huber 1995). Male chelicerae frequently equipped with special apophyses which are often species-specific (Huber 1995, 1999).

Male pedipalps are conspicuously large and strong (Huber 1999). Their complex morphology have been well demonstrated by Uhl *et al.* (1995). Externally the female genitalia is usually relatively simple, comprising of a more or less elevated area divided by a simple slit into anterior and posterior plates. On the anterior or genital plate (Uhl 1994) there may be special outgrowths, pits etc; posterior plate is here called accessory plate. Internal morphology of the female genitalia is very complicated (Huber 1995b, 1996b, 1998a). Recently several papers have been published about the genital mechanics of the Pholcidae (Huber 1994, 1995, 1996b, 1998b and Huber & Eberhard 1997).

Pholcids spin loose, irregular webs and males live in the same webs as females. The females carry the spherical egg cluster in their chelicherae. When disturbed many but not all (Huber, pers. com.) pholcid species can shake their webs in such a rhythm that they virtually disappear to the human eye. Also solitary specimens on firm ground can shake their bodies with the same result. Many pholcids are pantropical and synanthropic.

In the granitic Seychelles nine pholcid species belonging to eight genera have been recorded. Three of them are, at the present, found only on the granitic Seychelles while others are pantropical, apparently synanthropic species. The general distribution as well as

distribution in the granitic Seychelles is given for each species.

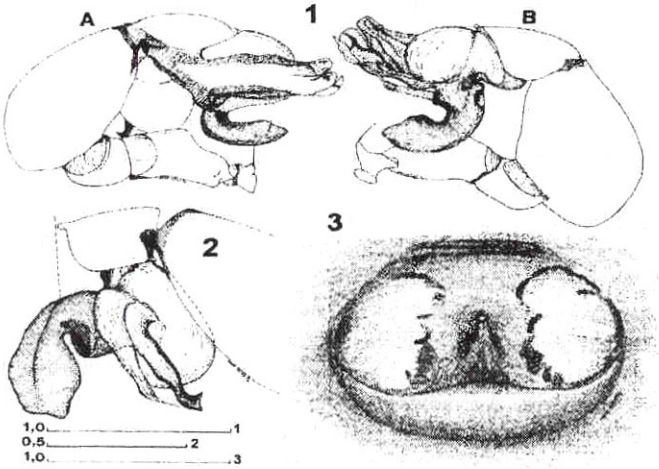
The material treated below belongs to the following collections:
MNHN = Muséum National d'Histoire Naturelle, France.
MRAC = Musée Royal de l'Afrique Centrale, Tervuren, Belgium.
MZT = Zoological Museum of Turku University, Finland.

New island records presented in this paper are indicated by an asterisk.

Pholcus longiventris (Simon, 1893), **new combination** (Figs. 1-6)

Spermophora longiventris Simon, 1893d: 321 (D j.m).
-"-, Kritscer 1956: 263, f. 15, 16 (D m).

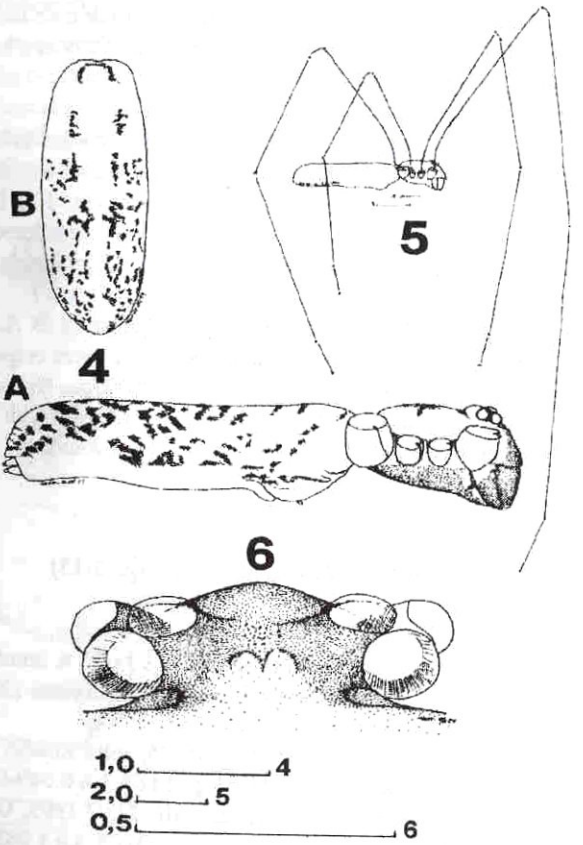
Material examined: SEYCHELLES: Mahé, Centre, Morne Blanc, versant Sud (470m elev.), 2mm6ff2j. 26.6.1972, P.L.G. Benoit & J.J. van Mol leg. (MRAC 143.070), Centre, La Misère (438m elev.), 1m6ff1j., 16.-17.6.1972, P.L.G. Benoit & J.J. van Mol leg. (MRAC 143.214), Baie Lazare, 1f, 26.6.1972, P. L. G. Benoit & J. J. van Mol leg. (MRAC 143.326), and Riv. Grand St. Lois, Le Niol, 1f, 30.9.-1.10. 1967, G. Marlier leg. (MRAC 148.417); Praslin, Vallée de Mai, 22.-23.7.1972, P.L.G. Benoit & J.J. van Mol leg. (MRAC 132.115); Silhouette, La Passe, 2ff, 11.01.1999, M. Saaristo leg. (MZT AA 1.059 and 1.060) and Belle Vue, pitfall traps, 1j., 16-20.07.1999, J. Gerlach leg. (MZT AA 1.308); FIJI: Viti Levu, 9mm6ff24j., P.T. Lehtinen leg. (MZT AA 3.415-3.419); THE PHILIPPINES: Luzon, 2ff2j., P.T. Lehtinen leg. (MZT AA 3.420).



Figs. 1-3. *Pholcus longiventris* (Simon, 1893) - 1: Right male palp retrolaterally (a) and prolaterally (b). - 2: Bulb from behind. - 3: Epigyneal area ventrally. - Orig.

Diagnosis: This is a medium-sized, rather darkish, long-legged pholcid with six eyes and a long, cylindrical abdomen. The males may be recognized by having a thin hair-like extension on the retrolateral side of the uncus and the females by the skittle-shaped, anteriorly pointing parmula on genital plate.

Description: A medium-sized species; total length ca. 4.2mm. Abdomen cylindrical, almost 4 time as long as high. Carapace with a darker median stripe starting from the clypeus and running to the posterior end of the carapace. Chelicerae, maxillae, labium and female palps also dark and sternum still darker. Abdomen with characteristic pattern formed by smaller scattered spots. Colouration of the legs of basic pattern. Both sexes have only six eyes, AMs being lost. Legs long and thin, the first pair being extraordinary long compared with the others. Leg formula 1,2,4,3; leg I ca. 7 x body length.



Figs. 4-6. *Pholcus longiventris* (Simon, 1893) - 4: Female abdomen dorsally (a) and cephalothorax and abdomen of the female dextrolaterally (b). - 5: Female detxrolaterally. - 6: Eyes of the female frontally.- Orig.

Male pedipalp massive. Trochanter very small with one lateral process bearing a hair. Femur with a ventral bulge. Tibia large, ovoid. Proximal part of the tarsus or cymbium galeiform, tarsal organ standing at the middle of its frontal edge. Distal part of the tarsus or procursus (= paracymbium of some authors) massive with complex apical part. Bulb on the ventral side of the cymbium provided with three prominent protrusions. The crooked uncus is heavily sclerotized, bearing a thin translucent, almost hair-like extension apically on its retrolateral side. The appendix is long and narrow with bifid apex. The embolus lying between uncus and appendix more or less soft, membranous. Genital and accessory plates somewhat protruding. Posterior border of the genital plate concave. Skittle-like, anteriorly pointing parmula approximately in the middle of the genital plate. Form of the translucent inner structures either side of the parmula very typical.

Distribution: Previously recorded from Sumatra. In this paper also from The Philippines, Fiji and Seychelles which indicates that the species probably has a wide distribution in the Old World tropics. In Seychelles it has been found on Mahé (Saaristo 1999 as *Pholcus sp. ign.*), Praslin (*), and Silhouette (Saaristo 1999 as *Pholcus sp. ign.*).

Discussion: So far, all members of the genus *Pholcus* have been recorded to have eight eyes. However, when the genital organs of the present species was compared with those of its type species, viz. *Pholcus phalangioides*, no fundamental differences could be found (see also Uhl *et al.* 1995 and Uhl 1994). Accordingly the present species is considered to be a member of the genus *Pholcus*. There are also other pholcid genera with variable number of the eyes.

Originally I believed this to be an undescribed species before Dr. B. A. Huber pointed out that it might be *Spermophora longiventris* Simon, 1893 which was originally described from a juvenile specimen from Sumatra. Later a male from the locus typicus has been described by Kritscher (1956). Comparisons of Kritscher's (1956) figures with my Seychellian samples as well as the material from The Philippines and Fiji have convinced me that they all represent the same taxon.

Micropholcus fauroti (Simon, 1887) (Figs. 7-15)

Pholcus fauroti Simon, 1887: 453 (mf).
Micropholcus fauroti, Deeleman-Reinhold & Prinsen 1987: 73 (mf; n. comb.).
N.B.: For more detailed synonym list see Deeleman-Reinhold & Prinsen 1987

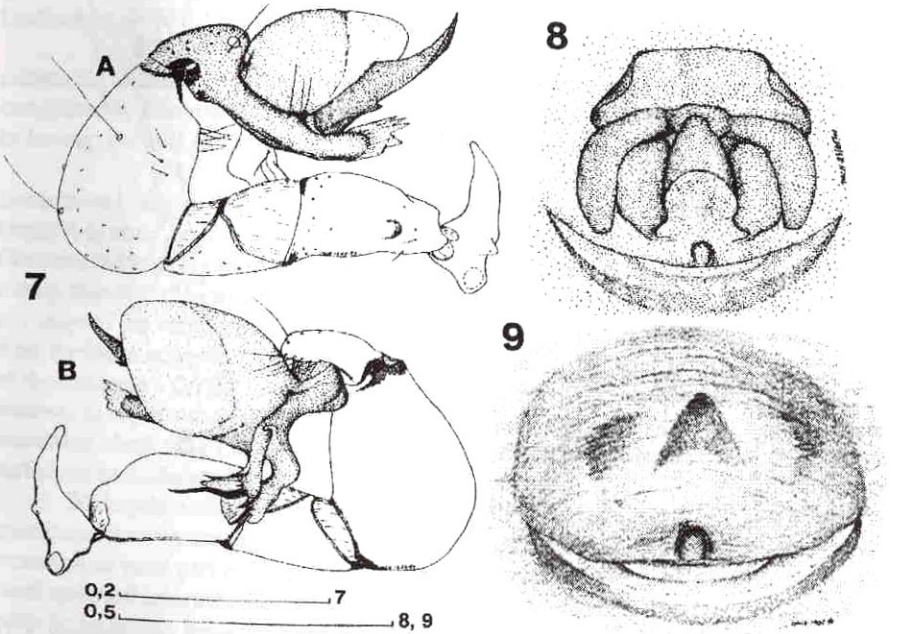
Material examined: SEYCHELLES: Aride, 1f, 19.08.1975, John Rowley leg. (MZT AA 0.051), Cousin, 1f1j., 08-09.04.1978, Hugh Watkins leg. (MZT AA 0.049-0.050), Cousine, 1f, 25.01.1999, M. Saaristo leg.(MZT AA 1.083) and 4ff, 23.07.1995, O. Bourquin leg. (MZT AA 2.143), and Mahé, 1f, 26.01.1999, M. Saaristo leg. (MZT AA 1.082); SRI LANKA: Colombo district, Negonbo, in cultural habitats, 1m1f2j., 24.-27. 09.1972, P.T. Lehtinen and Ilkka Oksala leg. (MZT AA 3.443) and Galle district, Dodanduwa, Katudampe, 1m1f, 02-03.03.1973, M. Saaristo leg. (MZT AA 3.444); VIETNAM: Ha Noi, on walls, mf, 21

X.1978, P.T. Lehtinen leg. (MZT AA 3.445)

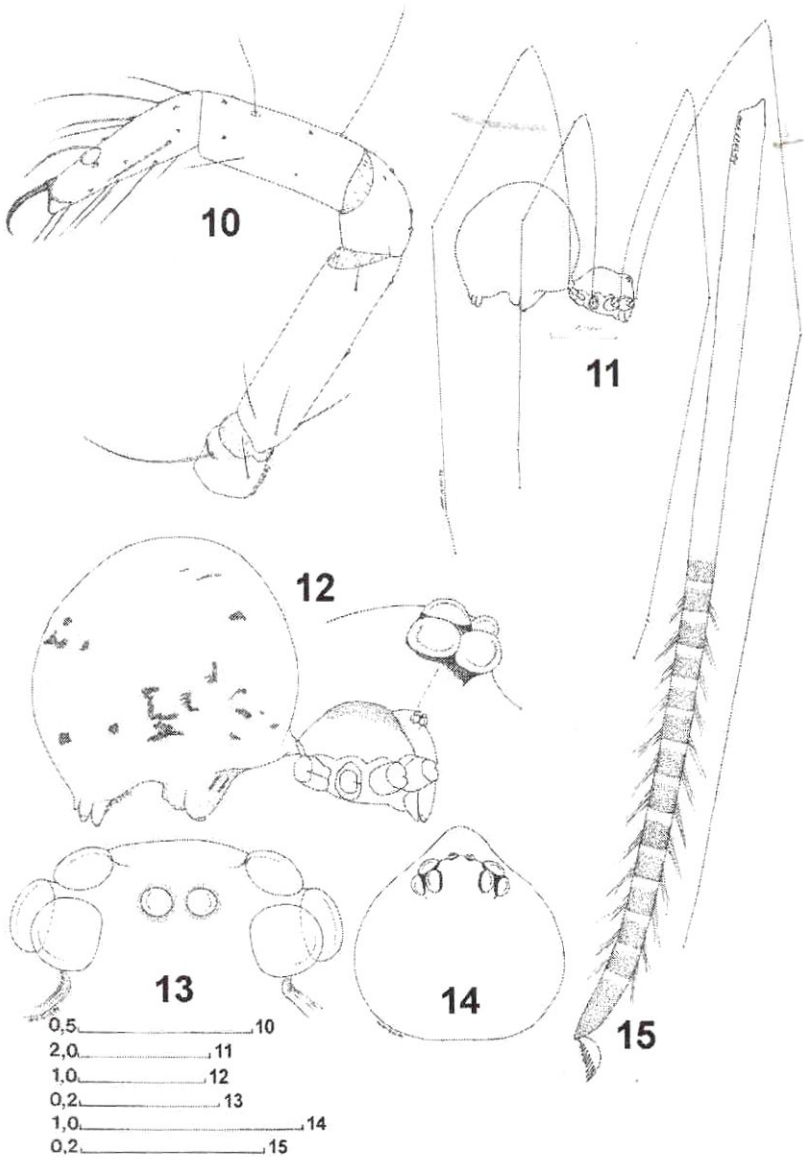
Diagnosis: This is a rather small, pale coloured, long-legged pholcid with eight eyes and a globular abdomen. The male of this species is most easily recognized by the large, blade-like apophysis hinged on the apicodorsal side of the procursor and the female by the small parmula at the posterior edge of the genital plate.

Description: A smaller species; total length ca. 2.8mm. The whole spider spider pale yellow; carapace with indistinct darker pattern and on abdomen some dark spots and streaks. Eye region barely higher than thorax, separated from it by a Y-shaped groove. AMEs small, others large, situated in two triads. Male chelicerae with three pairs of apophyses. Legs long and thin. Tarsi with some 13 secondary or false joints making it flexible from the half way onwards. Leg 1, 2,4,3; leg I ca. 6.5 x body length. Female palp with conspicuously large tarsal organ. Abdomen globular.

Male palpal trochanter with a small bulge in addition to the large spur. Procursus with a large blade-like extension hinged on its apicodorsal side. Embolus fringed apically; uncus divided apically in three sharply pointed strips; appendix reduced. Genital and accessory plates strongly protruding. Parmula short, lying at the posterior edge of the genital plate. Characteristic for the cleared epigyneal area is a large, cone-like median pocket behind



Figs. 7-9. *Micropholcus fauroti* (Simon, 1887). - 7: Right male palp laterally (a) and mesially (b). - 8: Structures of bursa copulatrix ventrally (epigyneal area cleared by KOH solution).- 9: Epigyneal area ventrally. - Orig.



Figs. 10-15. *Micropholcus fauroti* (Simon, 1887). - 10: Left female palp laterally. - 11: Female dextrolaterally. - 12: Dextrolateral view of the cephalothorax and abdomen of the female. - 13: Eyes of the female frontally. - 14: Carapace of the female dorsally. - 15: First tarsus of the female. - Orig.

Distribution: The species seems to have a very wide distribution being a pantropical, synanthropic species (Deeleman-Reinhold & Prinsen 1987). On the granitic Seychelles it has been collected from Aride (Bowler *et al.* 1999), Cousin (*), Cousine (Saaristo 1999) and Mahé (Saaristo 1999). The record from Silhouette (Saaristo 1999) is an error.

Artema atlanta Walckenaer, 1837 (Figs. 16-22)

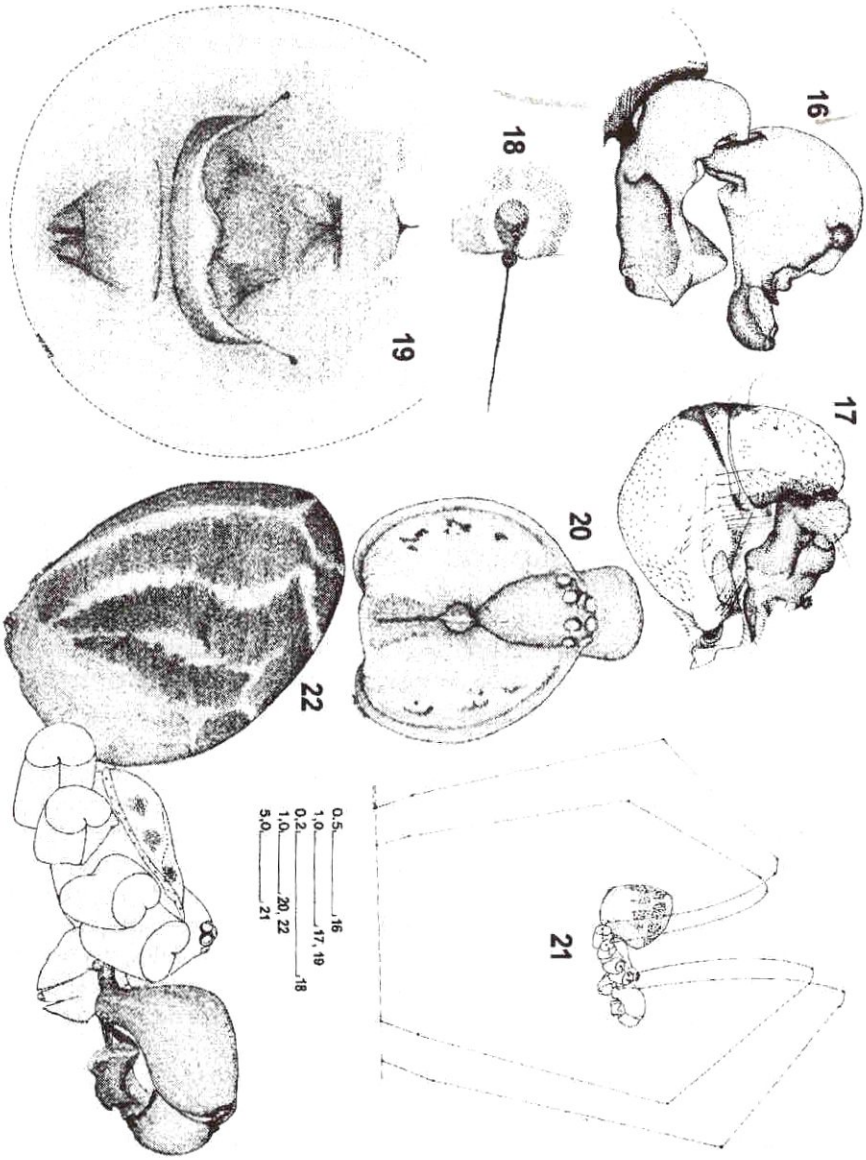
Artema atlanta Walckenaer, 1837: 565 (mf).
Artema mauriciana Walckenaer, 1837: 565 (mf).
Artema mauricia, Simon 1893c.
Artema mauriciana, Simon 1898: 375.
-"-, Hirst 1911: 381.
A. atlanta, Chrysanthus 1967: 92 (mf; *mauriciana* = *atlanta*).
-"-, Brignoli 1981: 92, f. 1-7 (mf).

Material examined: SEYCHELLES: Silhouette, La Passe, 3f3j., 08 & 11.01.1999, M. Saaristo and J. Gerlach leg. (MZT AA 1.061-1.063); INDIA: Kerala 1f5j., P.T. Lehtinen leg. (MZT AA 3.387); INDONESIA: Sulawesi, 1f1j., P.T. Lehtinen leg. (MZT AA 3.386); SRI LANKA: 1j., P.T. Lehtinen leg. (MZT AA 3.385); VIETNAM: Ha Noi, on walls, 1j., 21.10.1978, P.T. Lehtinen leg. (MZT AA 3.384).

Diagnosis: In addition to their appreciably large size the males of this species are easily recognized by the large serrate lamella on the anterior surface of the chelicerae and females by having two oval elevations anteriorly on the epigyneal area.

Description: This is a very large and robust species with more or less ovoid abdomen; total length 8-11mm. Legs long and heavily built. Leg 1,2,4,3; leg I ca. 6.5 times body length. Carapace rather flat, almost as wide as long. Ocular area elevated with eight eyes. Behind it a deep, roundish median depression which continues as a shallow channel towards the posterior edge of the carapace. Carapace pale yellow brown with brown median stripe starting from the lower edge of clypeus and running on both sides of ocular area to the posterior end of the carapace. On the lateral sides of carapace three more or less diffuse brown lateral patches, its edges also partially suffused with brown colour. Abdomen dirty white with dark somewhat bluish tint. Characteristic for the male are the large, serrate ridges at the anterior surface of each chelicer.

Male palp with a trochanter and large massive femur devoid of any apophyses. The procursus relatively small compared with the size of the bulb. There is a strong tooth-like extension on basal part of the procursus which has a quite simple apex. Bulb dorsally with a small spherical apophysis bearing tiny teeth; other bulbal sclerites fused together forming an embolic complex. Posterior border of the genital plate strongly concave and its posterolateral sides somewhat elevated. Two elliptical elevations on the anterior part of the epigyneal area, almost touching anteriorly and strongly diverging posteriorly.



Figs. 16-22. *Artema atlanta* Walkenaer, 1837. - 16: Distal part of the right male palp dorsally. - 17: Rigth male palp mesially. - 18: Colulus of the female. - 19: Abdomen of the female ventrally. - 20: Carapace of the male dorsally. - 21: Dextrolateral view of the male. - 22: Dextrolateral view of the male cephalothorax and abdomen. - Orig.

Distribution: This synanthropic species has a wide distribution in warm and tropical parts of the world. On the granitic Seychelles islands it has been collected from Bird (Hirst 1911), Mahé (Simon 1893c 1898, Hirst 1911), Praslin (Hirst 1911) and Silhouette (Saaristo 1999).

Discussion: In spite of the fairly busy collecting of the spiders on the granitic Seychelles during the last 25 years no specimens of *A. atlanta* were found. So, during my visit on Silhouette in 1999, it was very exiting to find a well established colony inside the dark and fairly humid basement of the main house of "Grande Case" as well as in an abandoned chicken house.

Physocyclus globosus (Taczanowski, 1893) (Figs. 23-34)

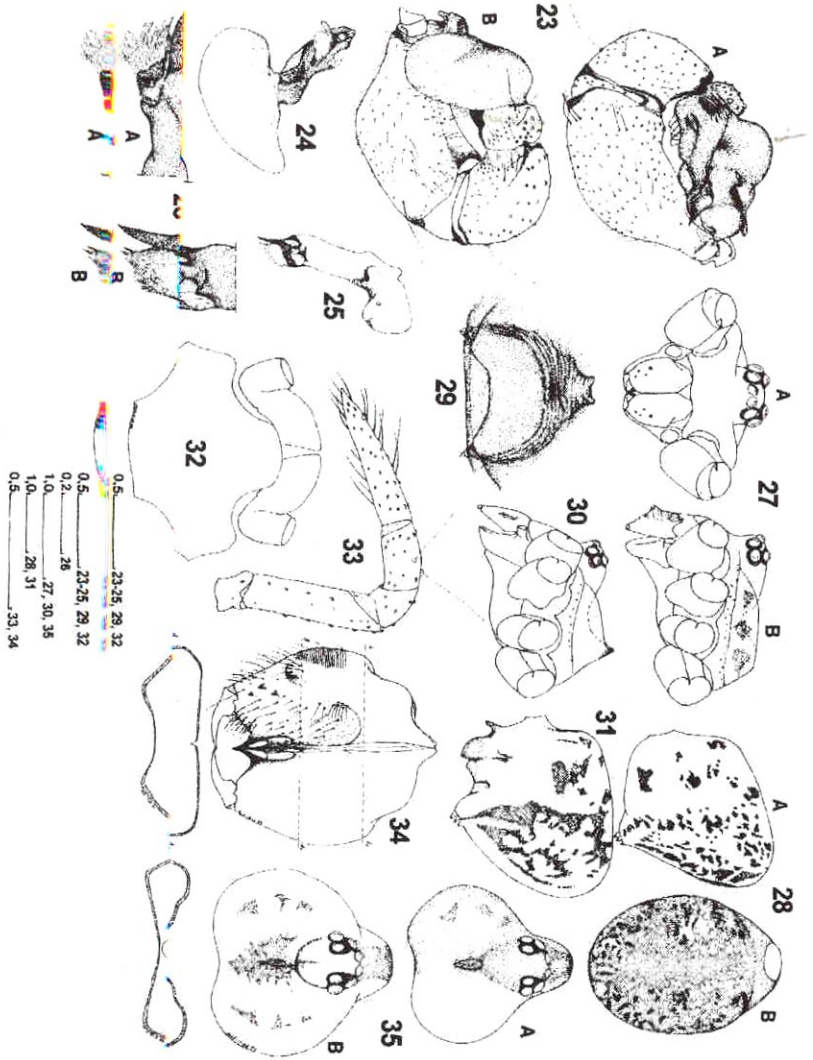
Pholcus globosus Taczanowski, 1893: 105 (f).
Physocyclus globosus, Simon 1893b: 470 (n. comb.).
-"- , Brignoli 1981: 94, f. 14-18, 21-24 (mf).

Material examined: SEYCHELLES: Cousine, 1f1j., 25.01.1999, M. Saaristo leg.; Mahé, La Rosiére 3m1f, Jan. 1999, P. Matyot leg. and 1m, 1990, J. Gerlach leg. (MZT AA 1.090-1.091) and Anse à la Mouche, July-August 1972, 2mm2ff7 juvs., P.L.G. Benoit & J.J. van Mol leg. (MRAC 143.436 & 143.453); Silhouette, La Passe, 1subad.m,2f2j., 08-15.01.1999, M. Saaristo leg. (MZT AA 1.086-1.088); ZANZIBAR: airport, 1m1f3j., 04.11.1975, M. Saaristo leg. (MZT AA 3.389)

Diagnosis: This is a quite large, pale coloured, long-legged pholcid with eight eyes and a globular abdomen, which is triangular in side view. The males are easily recognized by the voluminous bulb bearing a large embolic complex. Females may be recognized by the cone-like elevation of the posterior part of the carapace and the bifurcate elevation at the anterior part of the epigyne.

Description: A quite large species; total length varying between 3.5-5.3mm. Abdomen globular, pale brownish with intense dark spotting. Both sexes have stridulatory ridges on the lateral sides of the chelicerae. The area occupied by the ridges is darker than the rest of the chelicerae and also much smaller in the female than male. Median depression on the carapace deep and narrow. In the female there is a characteristic cone-like elevation at the posterior border of this depression and a heavily sclerotized spot opposite on the abdomen. Leg formula 1,2,4,3; leg I ca. 8 x body length.

Male palp with a simple trochanter and large massive femur devoid of any apophyses. The procursus relatively small compared with the size of the bulb. There is a strong apically rounded extension on basal part of the procursus which has a quite complex apex. Bulb smooth with a large embolic complex formed by fused bulbal protrusions. Posterior border of the genital plate concave. Anterior part of the epigyneal area with strong transverse wrinkles and a bifurcate elevation.



Figs. 23-34. *Physoclus globosus* (Taczanowski, 1873). - 23: Lateral (a) and mesial (b) view of the male palp. - 24: Bulb dorsally. - 25: Cymbium and procursus dorsally. - 26: Tip of procursus dorsally (a) and mesially (b). - 27: Cephalothorax of the male frontally (a) and laterally (b). - 28: Abdomen of the male laterally (a) and dorsally (b). - 29: - - Epigeal area ventrally. - 30: Cephalotorax of the female laterally. - 31: Abdomen of the female laterally. - 32: Maxillae, labium and sternum of male. - 33: Left female palp laterally. - 34: Male chelicherae frontally. - 35: Dorsal view of the female carapace (a) and that of the male (b). - Orig.

Distribution: According to Brignoli (1981) this is an American species which has been introduced to the tropics of the old world. On the granitic Seychelles it has been recorded from Cousine (Saaristo 1999), Mahé (*) and Silhouette (Saaristo 1999).

Genus *Cenemus*, new genus

Type species: *Holocnemus culiculus* Simon, 1898.

Etymology: The generic name is an arbitrary combination of letters and feminine in gender.

Diagnosis: In general appearance the new genus is closer to *Smeringopus* than *Holocnemus*, the genus in which its type species was originally described. The females of this new genus have the lip of the genital plate heavily sclerotized and of complex structure while females of *Smeringopus* and *Holocnemus* have unmodified, only lightly chitinized lips. Furthermore, on the genital plate there are two pairs of small pits and a large unpaired median depression which are all wanting in *Smeringopus* and *Holocnemus*. The males of the new genus have two translucent strips on the embolic complex which are not found in *Smeringopus* and *Holocnemus*.

Cenemus culiculus (Simon, 1898) (Figs. 36-41 & 47-48)

Holocnemus culiculus Simon, 1898: 375 (imm. f).
-"-, Saaristo 1978: 103-104, f.23-26, 39-45 (mf).

Material examined: SEYCHELLES: Mahé, La Misére (438 m elev.), 2mm5ff, 12.07.1972, P.L.G. Benoit & J.J. van Mol leg. (MRAC 143.201); Silhouette: Mare aux Cochons (500m elev.), 1f5j., 2.-8.7.1972, P.L.G. Benoit & J.J. van Mol leg. (MRAC 143.373), Chemin Montagne Possee, 2m2f2j., 09.01.1999, M. Saaristo and J. Gerlach leg. (MZT AA 1.103-1.104) and 1f1juv., sweep netting *Clidemia/Ipomoea macrantha/Asystasia*, 13.07.2000, J. Gerlach leg., (MZT AA 1.329), La Passe, 3m6f6j., 19.01.1999, M. Saaristo leg. (MZT AA 1.106-1.107), and Jardin Marron, 5m1f2j., 20.01.1999, M. Saaristo and J. Gerlach leg. (MZT AA 1.108-1.110).

Diagnosis: This is a colourful, quite large, long-legged species with cylindrical abdomen. The male of this species may be recognized by having the embolus arising from its base in an almost straight angle when the bulb is observed posteriorly. The female has the median part of the genital lip fairly deeply concave between the two small pits at its posterior edge while laterally from these pits the lip is convex, smoothly curving anteriorly.

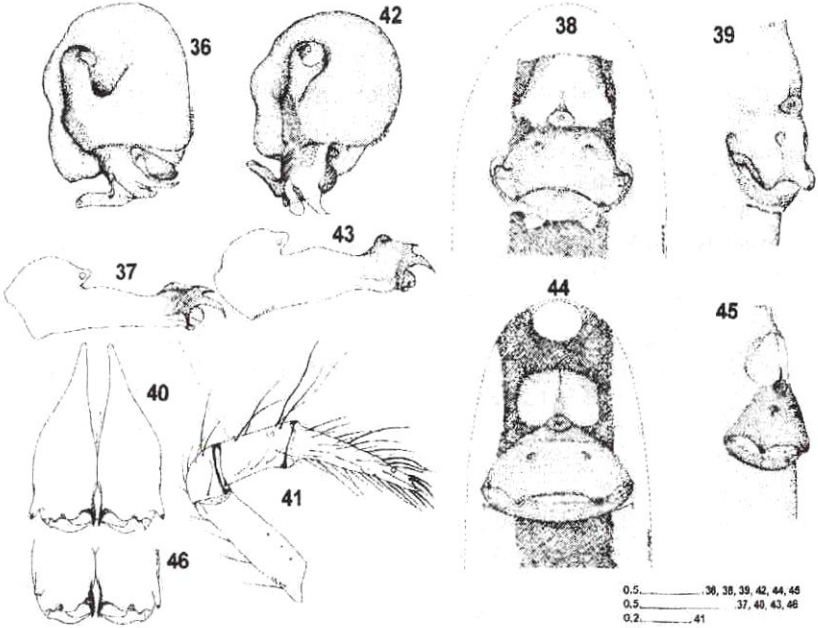
Description: Rather large species; total length ca. 4.5mm. Carapace snow white with black median and moss green lateral bands; chelicerae, maxillae and labium brown; sternum dark

purple with yellow-brown edges and median stripe; abdomen dirty white with dark bluish pattern; legs brown tinged with dark purple-blue, tips of femora and tibiae snow white. Carapace rather flat, about as wide as long (except at the area of the protruding clypeus). Ocular area moderately raised, turret-like with eight eyes; MAs rather small, others equal in size and in two triads. Chelicerae of both sexes with lateral stridulatory striae. Male chelicerae each with one apicolateral boss bearing a specialized, plug-like hair on its apex. Leg formula 1,2,4,3; leg I ca. 8.5 x body length.

The bulb of male palp smooth, spherical; embolus, appendix and uncus more or less fused together forming a relatively compact embolic complex. At the edge of the concave epigyneal lip two small, lateral pits and two somewhat larger pits more anteriorly on the genital plate. In addition an unpaired larger median sclerotized depression still anteriorly from the last mentioned pits.

Distribution: This endemic species has been collected from the following islands: Mahé (Simon 1898, Saaristo 1978 and 1999) and Silhouette (Saaristo 1999).

Discussion: The species was originally described from a juvenile specimen from Mahé. Adult males and females were first described by Saaristo (1978) from topotypical material collected in 1974 and compared with the type.



Figs. 36-46. *Cenemus culiculus* (Simon, 1898) (Figs. 36-41) and *Cenemus silhouette* n. sp. (Figs. 42-46). - 36 & 42: Right bulb posteriorly. - 37 & 43 Right cymbium and procursus dorsally. - 38 & 44: Epigyneal area ventrally. - 39 & 45: Epigyneal area dextrolaterally. - 40 & 46: Male chelicerae frontally. - 41: Right female palp laterally. - Orig.

***Cenemus silhouette*, new species** (Figs. 42-46)

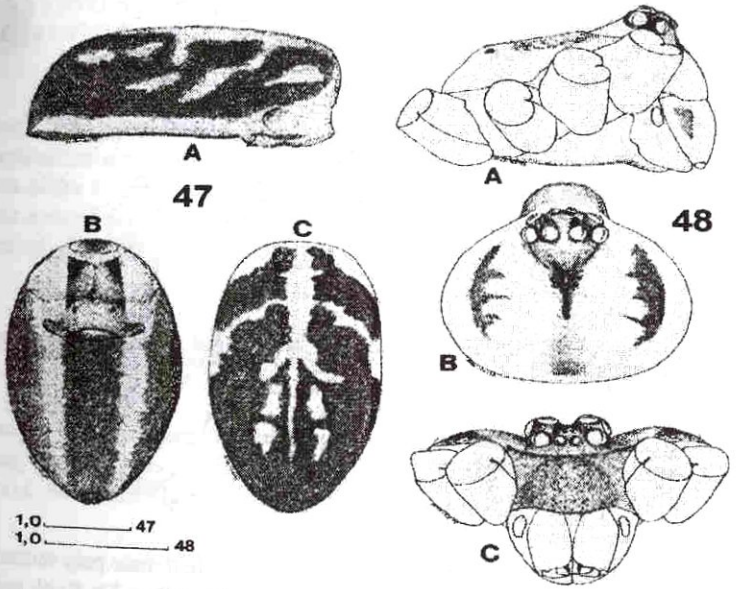
Types: Holotype male and two paratype females: SEYCHELLES, Silhouette, La Passe, among boulders behind the dam, 15.01.1999, M. Saaristo leg. (MZT AA 1.105); paratype male and subad. male: SEYCHELLES, Silhouette, *Pisonia* forest, 1990, Justin Gerlach leg. (MZT AA 0.280); four paratype females: SEYCHELLES, Silhouette, *Pisonia* forest, 1990, Justin Gerlach leg. (MZT AA = 0.281); one paratype female: SEYCHELLES: Silhouette, *Pisonia* forest, sweep netting, 06.07.2000, J. Gerlach leg. (MZT AA 1.331).

Etymology: The specific name is a noun in apposition taken from the type locality.

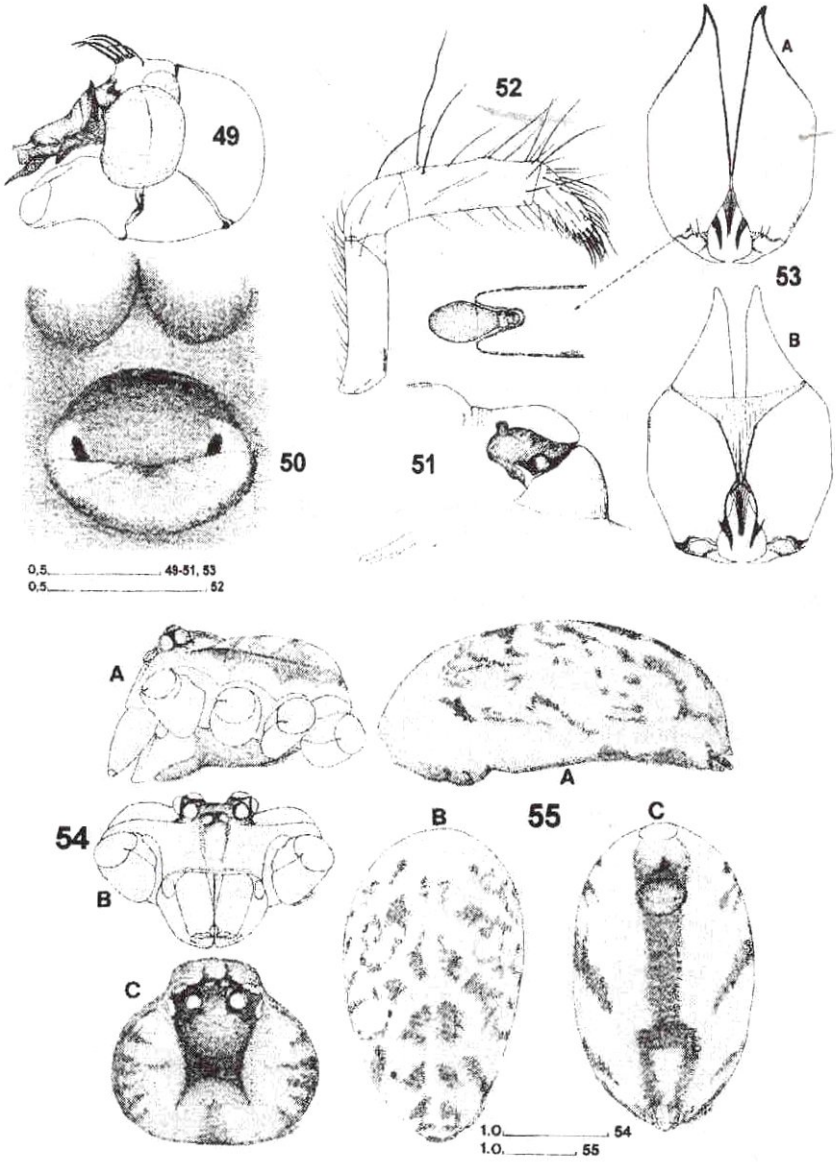
Diagnosis: Very close to proceeding species. The male may be recognized by having the embolus arising from its base at an acute angle when the bulb is observed posteriorly. The female has the median part of the genital lip only slightly concave between the two small pits at its posterior edge while laterally from these pits the lip at first abruptly curves anteriorly and then laterally.

Description: This species is about the same size as the preceding species. Also the colour pattern is alike. The two species can be distinguished by their genital organs.

Distribution: Known only from **Silhouette**.



Figs. 47-48. *Cenemus culiculus* (Simon, 1898). - 47: Abdomen of the female dextrolaterally (a), dorsally (b), and ventrally (c). - 48: Carapace of the female dextrolaterally (a), dorsally (b), and fron-tally (c). - Orig.



Figs. 49-55. *Smeringopus pallidus* (Blackwall, 1858). - 49: Right male palp mesially. - 50: Epigyneal area ventrally. - 51: Epigyneal area dextrolaterally. - 52: Rigth palp of the female laterally. - 53: Chelicerae of the male frontally (a) and from behind (b). - 54: Abdomen of the female dorsally (a), dextrolaterally (b), and ventrally (c). - 55: Cephalothorax of the female dorsally (a) frontally (b), and sinistrolaterally (c). - Orig.

Smeringopus pallidus (Blackwall, 1858) (Figs. 49-55)

Pholcus pallidus Blackwall, 1858: 433 (-).
Pholcus elongatus Vinson, 1863: 307 (-).
Smeringopus elongatus, Simon 1890: 10 (n. comb.).
-"-, Simon 1898: 375.
Smeringopus pallidus, Mello-Leitao 1918: 121 (n. comb.).
S. elongatus, Hirst 1911: 381.
S. pallidus, Kraus 1957: 219, f. 1-6 (mf; *elongatus* = *pallidus*).
-"-, Saaristo 1978: 102, f. 23-30, 31-38 (mf).
(N.B.: For more detailed synonym list see Kraus 1957)

Material examined: SEYCHELLES: Cousine, from under rocks (cave) on N. hill, 2f, 05.05.1997, Peter Hitchins leg. (MZT AA 0.386) and 2m10f5j., 23. and 25.01.1999, M. Saaristo leg. (MZT AA 1.092-94 and 1.10-1.101); Mahé 1f, VIII-IX.1966, Miss. Zoologique MRAC-ILB (MARC 130.809), riv. Grand Anse, 10.10. 1976, 1m7f7j., G. Marlier leg. (MRAC 148.430), and Montagne Posée Road, underside of hudge granite blocks, 31.10.1975, M. Saaristo leg. (MZT AA 0.005); Silhouette, La Passe, 4m3f4j., 07.-17.01.1999, M. Saaristo leg. (MZT AA 1.095-1.098), Chemin Montagne Posée, 4f, 09.01.1999, M. Saaristo leg. (MZT AA 1.099) and Mare aux Cochons, 1m, 2-8.7.1972, P.L.G. Benoit & J.J. van Mol leg. (MRAC 143.373).

Diagnosis: This is a colourful, fairly large, long-legged (leg I ca. 8.5 x body length) species with a cylindrical abdomen. The male of this species can be easily recognized by having both branches of the T-shaped embolic complex of equal size. The female has a dark spot in the posterior corners the genital plate and a pair of small dots in its anterior edge, accessory plate large, mostly dirty white with a narrow darker border.

Description: The species has been well described by Kraus (1957) and Saaristo (1978).

Distribution: In the granitic Seychelles this cosmotropical species has been found on the following islands: Cousine (Saaristo 1999), Long Island (Hirst 1911), Mahé (Simon 1898, Hirst 1911, Saaristo 1978 and 1999), Praslin (Hirst 1911) and Silhouette (Saaristo 1999).

Modissimus culicinus (Simon, 1893) (Figs. 56-60)

Hedypsilus culicinus Simon, 1893a: 322 (m).
-"-, Simon 1893b
: 484, f.483, 484, 486 (m).
Hedypsilus Lawrencei de Lessert, 1938: 434, f. 15-17 (mf).
Hedypsilus culicinus, Gertsch & Peck 1992: 1191, f. 20-26 (mf).
Modisimus culicinus, Huber 1996: 233, f. 2-4 (mf = *Hedypsilus lawrencei* de Lessert, 1938).

Material examined: VENEZUELA, Orinoco, type material of *H. culicinus* (MNHN: B 730, n:o 9629); ZAIRE: Kananga (= Luluaburg in former Belgian Congo), syntypes (m2ff) of *H. lawrencei* (MRAC 12943/12944); SEYCHELLES: Aride: by pitfall trap, subad.m, 19.08,1975, John Rowley leg. (MZT AA 0.052); Cousin: 3f, 1978, Hugh Watkins leg. (MZT AA 0.053-0.055); Cousine: 6m20f10j., 23.-25.01.1999, M. Saaristo leg., Curieuse: Baie Laraie, 1f, 12.7.1972, P. L. G. Benoit & J. J. van Mol leg. (MRAC 143.277)., Grande Soeur: 4m, 10. and 17.09.1975, M. Mühlenberg leg. (MRAC 177.130, 177.151, 177.172, and 177.173), Mahé: 1 f 28.12.1993, J. Gerlach leg. (MZT AA 1.081), Petit Soeur: 7m, 17.and 24.09.1975, M. Mühlenberg leg. (MRAC 177.102, 177.107, 177.137, 177.139, 177.141, and 177.174), Praslin: Fond de l'Anse, 4mm9ff, 16.-23.8.1972, P.L.G. Benoit & J. J. van Mol leg. (MRAC 143.394) and Silhouette: La Passe and Anse Cimitiere, 10-22.01.1999, M. Saaristo and J. Gerlach leg. (MZT AA 1.065-1.071).

Diagnosis: This is a small species with moderately long legs (leg I ca. 4.5 x body length), globular abdomen and distinct pattern of dark spots on carapace. The male of this species is easily recognized by the rounded tubercule fringed with short hairs on the frontal side of the eye-turret. Female alike but without the tubercule.

Description: The species has been well described by Huber (1996).

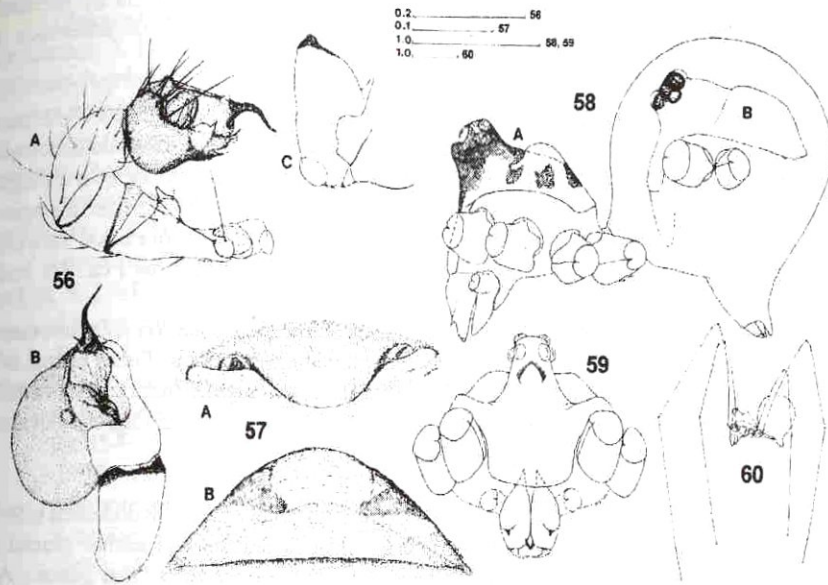
Distribution: According to Gertsch and Peck (1991) this is a widespread American species which has been introduced to many places by commerce and Huber (1996) supposed it to be pantropical. It is new to Seychelles and has been collected there on Aride (Bowler *et al.* 1999), Cousin (*), Cousine (Saaristo 1999), Curieuse (*), Grande and Petit Soeur (*), Mahé (Saaristo 1999), Praslin (*) and Silhouette (Saaristo 1999).

***Spermophorides lascars*, new species** (Figs. 61-64)

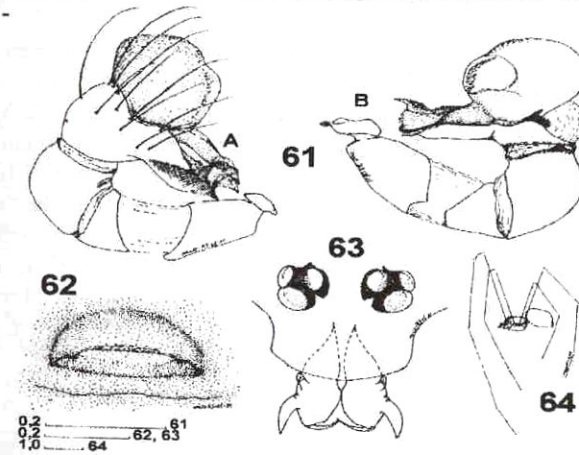
Types: Holotype m and 3f and 4j. paratypes: Seychelles, Silhouette, eastern slope of Mont Poules Marrons close to Anse Lascars, 12.01.1999, J. Gerlach leg. (MZT AA 1.064).

Etymology: The specific name is a noun in apposition taken from the type locality.

Diagnosis: A small, rather pale coloured, long-legged pholcid with six eyes and a globular



Figs. 56-60. *Modisimus culicinus* (Simon, 1983). - 56: Right male palp laterally (a), dorsally (b), and palpal femur dorsally (c). - 57: Epigyneal area ventrally (a) and dorsally (b). - 58: Sinistrolateral view of the male with legs omitted (a) and carapace of the female sinistrolaterally (b). - 59: Frontal view of the male cephalothorax. - 60: Lateral view of the male. -



Figs. 61-64. *Spermophorides lascars* n. sp. - 61: Right male palp laterally (a), dorsally (b), and palpal femur dorsally (c). - 62: Epigyneal area ventrally. - 63: Frontal view of the male cephalothorax. - 64: Lateral view of the male. - Orig.

abdomen. The male may be recognised by the dorsally attached bulb and by the two retrolateral cheliceral apophyses and the female by having a small denticle on either side of the posterior edge of the genital plate.

Description: This is a small species with a globose abdomen; total length 1.14-1.29mm. Cephalothorax pale orange; legs of the same colour but darker; abdomen dirty white, dorsally decorated by numerous violetish patches. Carapace low; both sexes with six eyes arranged in two triads. Male chelicerae armed with two retrolateral horn-like apophyses; the apical one acute, pointing downwards and some three times as large as the more basal, upward pointing, blunt-tipped one. Legs long and thin. Leg formula 1,2,4,3; leg I ca. 7 x body length.

Bulb of the male palp attached dorsally. Its globular part large; on its anteromesal side a large, shallow bulge. Embolus relatively long, flat and transparent. On its mesial side projects an elongated protrusion, probably appendix. It has a triangular basal part and a thin strongly sclerotized, crooked apical part. Genital and accessory plates slightly elevated. Genital plate with a small denticle on either side of its posterior edge.

Discussion: In his study "On the spider fauna of the Macronesian islands" Wunderlich (1991) noted that all those pholcid species from Canary Islands that he had earlier placed in *Spermophora* Hentz, 1848 were not congeneric with the type species of that genus. Accordingly he created a new genus, *Spermophorides*. I fully agree with Wunderlich (1991) and therefore describe the above new species in *Spermophorides*. It should also be noticed here that the dorsally attached bulb of *Spermophorides* reminds one of the New World genus *Metagonia* Simon, 1893 (Hubert 2000: 53). However, in several other respects *Spermophorides* differs considerably from *Metagonia*.

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The ecology of North island

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Abstract: North island, Seychelles was the first island of the group to be explored in 1609 but has no accounts of the ecology of the island have been published previously. This paper describes the current state of the ecology of the island, which is dominated by alien habitats and supports a much reduced fauna and flora. The potetial for restoration ond reintrodctuion of threatened species is very high. Species lists for fungi, plants and animals are given.

Keywords: *Cocos nucifera*, conservation, *Lantana camara*, restoration, Seychelles

Introduction

North island was the first island in the Seychelles group to be explored when a landing was made on 20th January 1609. John Jourdain's journal of the time records this event and the first biological observations from the group: "the boate reourned and brought soe many land toerells as they could carrie... and soe greate that eight of them did almost lande our skiffe (sic)." (Foster 1905). Unfortunately there are no further records of the early history of the island, beyond a note of an extensive fire (de Malavois in Fauvel 1909). During the 19th and 20th centuries the remaining natural forest habitats were replaced by an extensive coconut plantation and all of the island was managed for agriculture. In the late 20th century there were visits to the island to collect plants (Robertson 1989; Friedmann 1994) and reptiles (Cheke1984; Gardner 1987). The first general ecological observations were made during a short visit by RSPB staff in 1997 when the low diversity of the fauna was noted and introduced mammals recorded (dogs, cats, cows, goats and rats). This visit paid particular attention to the land-birds but failed to locate some of the commoner species (e.g. sunbirds and kestrels) that are present on the island. A more thorough study was made in November 1997, although only Odonata were recorded (Wain *et al.* 1999). Collections of invertebrates were made in 1999 but have not been made available for study, the only extensive faunal surveys were made in July 2000 by the authors.

Physical geography and habitats

North island is situated in the north-west of the granitic Seychelles islands and shares a distinctive geology with Silhouette, the nearest island. Although it has three hills over 100m high (Grand Paloss 180m, Bernica 110m, Congoment 102m) almost half the island can be categorised as plateau (42ha), an exceptionally high proportion for the granitic islands. This plateau includes a significant marsh (1.5ha), grass areas (mostly around the settlement) but is mainly covered with woodland. The great majority of this is abandoned coconut plantation which has been invaded by *Lantana camara* and *Psidum cattleianum*. There is a

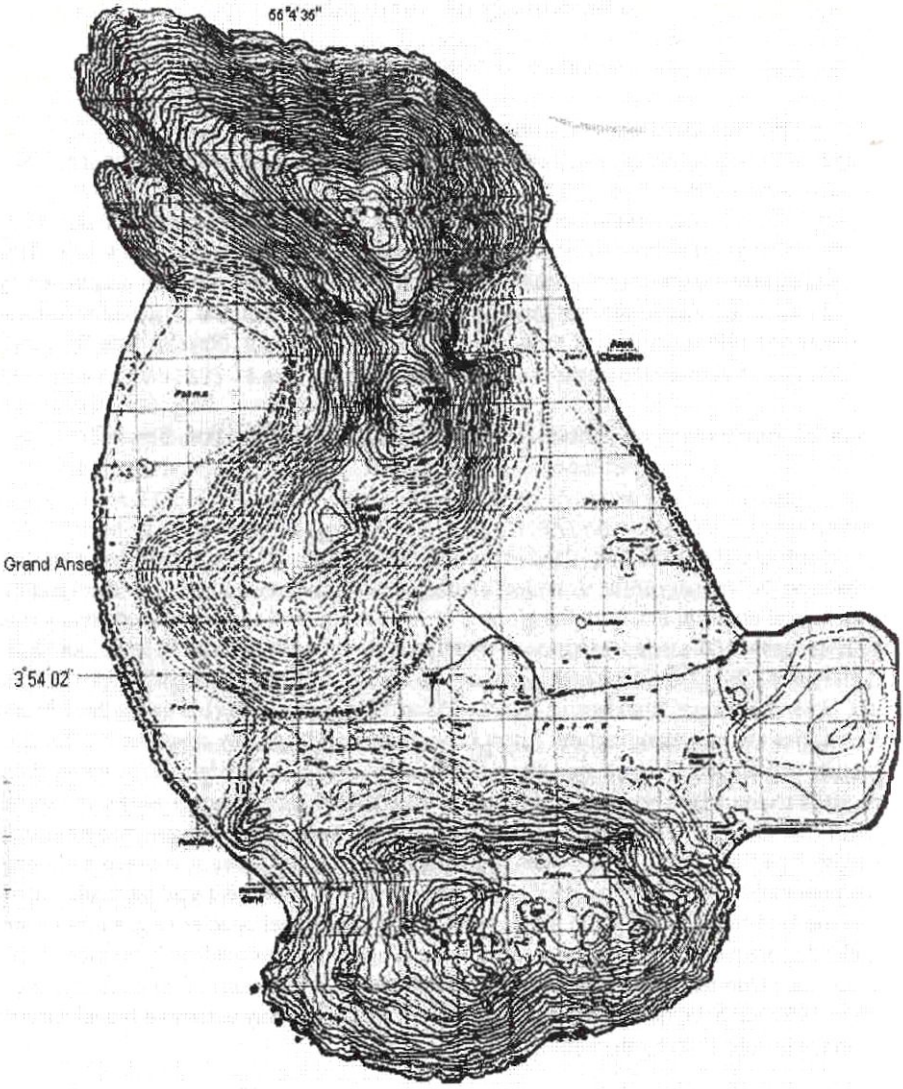

Fig. 1. Map of North island

central area of mixed woodland, composed of *Cocos nucifera*, *P. guavava* and *Anona muricata*. To the north-west end of the plateau an area of *Calophyllum inophyllum* woodland was present, with patches of *Terminalia catappa*. The *C. inophyllum* are now largely dead due to infection by vascular wilt. Coastal vegetation is dominated by grass on the east coast and by coastal trees (*Guettarda speciosa, Thespesia populnea, Hibiscus tiliaceus* and *Casuarina*

equisetifolia) on the west coast. Glacis areas appear to support semi-natural glacis vegetation, with abundant *Pandanus multispicatus*.

Flora

136 species of angiosperm and 3 ferns have been recorded from North island (see Appendix). Bryophytes appear to be restricted to a single species. The proportion of alien species is exceptionally high (57%) and the only Seychelles endemic plant recorded from the island is *Pandanus balfouri*.

Fauna

The fauna is very poor for an island of its size as has been noted previously (Lucking *et al.* 1997), previous reports have attributed this to predation by rats but this is unsubstantiated and probably reflects the impact of alien habitats rather than predation. The present study recorded a wide range of animal classes but little species diversity, notably poor groups include Isopoda, of which only a single specimen could be found. Despite the paucity of invertebrates, reptiles are relatively abundant with significant populations of skinks (*Mabuya seychellensis*), geckos (mainly *Phelsuma sundbergi* and *Urocotyldeon inexpactatus*) and snakes (*Rhamphotyphlops braminus*). Of the species expected to be present but not recorded to date the gecko *Ailuronyx seychellensis* may survive in small numbers in the crowns of the coconut trees. The skink *Pamelascincus gardineri* appears to be absent. There are no Wright's skinks (*Mabuya wrightii*) but the historical presence of a guano sifting plant on the island indicates that a seabird colony was present in the past and this would have been likely to support a *M. wrightii* population. Introduced Aldabran tortoises (*Dipsochelys dussumieri*) are present although the number has declined over recent years and the present population seems to be restricted to four individuals (of which only one is female). Tortoises were present historically (Foster 1905) but which species was represented is not known. The Mascarene frog *Ptychadena mascariensis* is locally abundant in the marsh but caecilians appear to be absent.

The avifauna of the island may have included a tern colony in historical times but there are no records of species composition of any such colony. A diverse land-bird fauna was probably present in the past but is now restricted to the common, adaptable species and a significant population of Seychelles kestrel (*Falco araea*). Kestrels appear to be present all year round but they may not represent a significant breeding population at present. It is possible that there is a high level of immigration of young birds from the major population on Silhouette. North island may represent a population sink for this species although the juxtaposition of nesting cliffs and extensive feeding habitat should allow for the establishment of an important breeding population.

The marsh area has been occupied by migratory garganey (*Anas querquerula*), black-crowned night herons (*Nycticorax nycticorax*) and green-backed herons (*Butorotides striatus*). No breeding has been recorded by any herons on North island but the marsh could support important breeding populations of night herons and yellow bitterns (*Ixobrychus sinensis*) if a more extensive area of permanent water developed.

Although the invertebrate fauna appears to be very restricted it does include some taxa of note; only three species of terrestrial mollusc have been recorded but these do not

include any introduced species that are so common on most other islands and includes one Seychelles endemic species. The lowland habitats would be expected to support abundant and diverse dipteran flies but comparatively few species have been collected. Of these one species of Psychodidae is identifiable as an undescribed species. Although it was expected that new species would be found in the most natural habitat areas and that the alien habitat would be occupied by cosmopolitan species this new fly has been found in the *Lantana camara* scrub under the coconut plantation.

The Lepidoptera are similarly restricted but the presence of the bee hawkmoth *Cephonodes hylas virescens* is notable. A report of the butterfly *Euploea mitra* was included in the Environmental Impact Assessment document for the island development but this is in error for *Hypolimnas missipius*.

Conservation

North island supports a highly degraded flora and predictably the fauna is very restricted. Notable points are the high diversity of dragonflies and damselflies, the absence of alien snails and the presence of at least 2 Seychelles endemic cockroaches. The most valuable habitats on the island appear to be the central marsh area and the *Calophyllum* woodland. The rock areas are probably also of conservation significance although their contribution to general biodiversity appears to be low. The value of the *Calophyllum* woodland may be reduced by its lack of floral diversity and the rapid spread of takamaka wilt across the island. This disease was not apparent in 1999 but was causing significant mortality by July 2000. The presence of the endemic slug *Vaginula seychellensis* may indicate that the island originally supported a wider range of molluscs. A record of the original mollusc and vertebrate fauna may be preserved in the soils of the plateau and marsh. Investigation of these would be a valuable source of information for use in planning any future animal reintroductions.

The main causes of the present low-diversity fauna and flora are probably historical fires, invasion by alien plants (particularly *Lantana camara*, *Psidium* spp. and *Anona muricata*) and disturbance of specific habitats by introduced mammals. Of the mammals the goats were removed in recent years and the primary disturbance has recently been caused by cows. In the marsh area and adjacent woodland their impact has been very great with selective grazing and trampling. The removal of the cows should help native vegetation to become re-established. Naturally tortoises would have disturbed the marsh area and grazed selectively on some plants but the impact is likely to have been less.

The biological value of North island would be considerably enhanced with some control of the more dominant alien species and removal of much of the old coconut plantation. The extensive marsh area should facilitate the restoration of good quality lowland forest. Following habitat restoration North island could provide a valuable locality for the reintroduction of threatened species. The potential for reintroduced land-birds such as the Seychelles magpie robin (*Copsychus sechellarum*), Seychelles black paradise flycatcher (*Terpsiphone corvina*) and Seychelles warbler (*Acrocephalus sechellensis*) is clear and has been referred to in numerous reports and in the press. The critically endangered Seychelles population of yellow bittern could also develop a valuable population around the marsh (Gerlach & Skerrett 2001). There is also clear potential for other taxa such as the Seychelles giant tortoises (in particular the grazing species *Dipsochelys hololissa*) and black terrapin

(*Pelusios subniger intergularis*) (Gerlach & Canning 2001). Less obvious candidates for reintroduction include invertebrates which will have existed on the island until their habitat was lost by fire, these include the giant millipede *Seychelleptus seychellarum* and the giant tenebrionid beetle (*Pulposipes herculeanus*), which remains of conservation concern.

Any conservation management of North island will almost certainly wish to increase the plant diversity on the island by planting native and endemic species. There are several areas on the island which could support endemic palm forest and it would be desirable to encourage the re-growth of *Pandanus* groves in these areas. Wright's gardenia (*Rothmannia annae*) could be established in restored woodland and should prove to be of aesthetic benefit to the island and conservation benefit to this endangered species.

The topography of North island would appear to be well suited to the development of a large butterfly population as is seasonally present on the flat, sandy islands of Bird and the Amirantes (J.G. pers. obs.). The current poor fauna could easily be encouraged by increasing the abundance of favoured food plants, such as *Intsia bijuga* for nectar production and *Portulaca oleracea* for the larvae of *Hypolimnas missipius*. This is the only conspicuous butterfly likely to be recorded regularly on the island. The bee hawkmoths (*Cephonodes* spp.) could be encouraged by planting *Canthium bibracteatum* and *Morinda citrifolia* may encourage the hummingbird hawkmoth (*Macroglossum alluaudi*). These are all abundant on Silhouette (Gerlach 1998 & 2000) and natural recolonisation is highly probable.

Any reintroduction plans for North island should consider the biogeographical patter of the islands. Both Silhouette and north islands are relatively isolated from the rest of the granitic group and significant gene flow between these islands is more likely than between either of them and from other islands. Consequently where possible Silhouette should be used as the source of animals or plants used on North island.

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Appendix. North island species list

			Species recorded
FUNGI			2
PLANTAE	Bryophyta		1
	Pteridophyta		3
	Spermatophyta		
ANIMALIA	Annelida	Oligochaeta	1
	Mollusca	Gastropoda	3
	Crustacea	Isopoda	1
		Decapoda	3
	Arachnida	Scizomida	1
		Araneae	20
		Acari	?
		Ablipygii	1
	Myriapoda	Diplopoda	3
		Chilopoda	2
	Apterygota		?
	Hexapoda	Odonata	4
		Orthoptera	4
		Dictyoptera (Blattoidea)	4
		Isoptera	1
		Dermaptera	2
		Hemiptera	1
		Psocoptera	?
		Thysanoptera	1
		Neuroptera	1
		Lepidoptera	8
		Diptera	>1
		Hymenoptera	>5
		Coleoptera	>4
	Chordata	Amphibia	1
		Reptilia	6
		Aves	6
		Mammalia	4

FUNGI

Ganoderma australe

PLANTAE

BRYOPHYTA - 2 sp.

PTERIDOPHYTA

PTERIDACEAE ***Pteris friesii*** Hieron - Afr., western Indian Ocean; M, S, N & P.
DAVALLIACEAE ***Nephrolepis* cf. *biserrata*** - ?; widespread
ASPLENIACEAE ***Diplazium sechellarum*** (Baker) C.Chr. - Mad.; M & N.

SPERMATOPHYTA

ACANTHACEAE ***Asystasia* sp. B** ? - widespread
AGAVACEAE ***Agave sisalana*** Intr.; widespread
AMARANTHACEAE ***Achyranthes aspera*** Indo-Pacific; widespread. ***Amaranthus dubius*** Indo-Pacific; widespread.
ANACARDIACEAE ***Anacardium occidentale*** - Intr.; widespread. ***Manguifera indica***. - Intr.; widespread. ***Spondias cytherea*** - Intr.; widespread.

ANNONACEAE ***Annona cherimoya*** - Intr.; N. ***Annona muricata*** - Intr.; M, N, P & Co. ***Annona reticulata,*** - Intr.; N. ***Annona squamosa,*** - Intr.; N

APOCYNACEAE ***Catharanthus roseus*** - Intr.; widespread. ***Ochrosia oppositifolia*** - Indo-Pacific; widespread.

ARACEAE ***Philodendron*** **sp.** - Intr.; M, S, N, P

BIGNONIACEAE ***Tabebuia pallida*** - Intr.; widespread.

BORAGINACEAE ***Cordia subcordata*** Indo-Pacific; widespread. ***Heliotropium indicum*** - Intr.; widespread.

CAESALPINIACEAE ***Senna occidentalis*** - Intr.; widespread. ***Tamarindus indica.*** - Intr.; widespread.

CAPPARACEAE ***Cleome viscosa*** - Intr.; widespread.

CARICACEAE ***Carica papaya*** Intr.; widespread

CARYOPHYLLACEAE ***Drymaria cordata*** Intr.; M, S, N, F.

CASUARINACEAE ***Casuarina equisetifolia*** - SE Asia; widespread.

CHRYSOBALANACEAE ***Chrysobalanus icaco*** - Intr.; widespread.

COMBRETACEAE ***Terminalia catappa*** Indo-Pacific; widespread.

COMMELINACEAE ***Commelina benghalensis*** - Intr.; N, Cur & A. ***C. diffusa*** - Intr.; N & Co.

COMPOSITAE ***Emilia sonchifolia*** Intr.; M, S, N & F. ***Synedrella nodiflora*** Intr.; M, S, N, Co, F & B. ***Tridax procumbens*** Intr.; M, S & N. ***Vernonia cinerea,*** Intr.; widespread.

CONVOLVULACEAE ***Ipomoea aquatica*** - Intr.; M, S, N, Cur & A. ***I. mauritiana*** - Masc.; M, SA, S & N. ***I. pes-caprae*** - Indo-Pacific; widespread.

CYPERACEAE ***Cyperus articulatus*** Pantrop.; M, S, N, P & LD. ***C. compressus*** M, S, N, A & F ***Fimbristylis complanata*** Intr?; widespread. ***F. cymosa*** Pantrop.; widespread. ***Kyllinga monocephala*** M, S, N, Co & F. ***K. polyphylla*** Indian-Ocean; widespread. ***Mariscus dubius*** Pantrop.; widespread. ***Pycreus polystachyos*** Indian Ocean; widespread.

EUPHORBIACEAE ***Euphorbia hirta*** Intr. widespread. ***E. thymifolia*** Intr.; widespread. ***Jatropha curca*** Intr.; M, S, N, P & F. ***Phyllanthus amarus*** Intr.; widespread. ***Phyllanthus urinaria*** Intr.; M, S, N & F.

GOODENACEAE ***Scaevola sericea*** Indo-Pacific; widespread.

GUTTIFERAE ***Calophyllum inophyllum*** - Indo-Pacific; widespread.

HERNANDIACEAE ***Hernandia nymphaeifolia*** Indo-Pacific; widespread.

LABIATAE, ***Leucas lavandulifolia*** Intr.; M, S, N & F . ***Ocimum gratissimum*** Intr. - M, S & N. ***Plectranthus amboinicus*** Intr. - M, S, N, P & A.

LECYTHIDACEAE ***Barringtonia asiataica*** Indo-Pacific; widespread.

LILIACEAE ***Dracaena reflexa*** Mad.; widespread.

MALVACEAE ***Abutilon fruticosum*** Intr.; S & N. ***Hibiscus tiliacaeus*** Indo-Pacific; widespread. ***Sida rhombifolia*** Intr.; S & N. ***S. stipulata*** Intr.; widespread. ***Thespesia populnea*** Indo-Pacific; widespread. ***Urena lobata*** Intr.; widespread.

MARANTACEAE ***Maranta arundinacea*** Intr.; widespread.

MELIACEAE ***Sandoricum koetjape,*** Intr.; M, S, N & P. ***Xylocarpus moluccensis*** Indo-Pacific; M, S, N, P & Cur.

MIMOSACEAE ***Albizia lebbeck,*** Intr.; widespread. ***Paraserianthes falcataria,*** Intr.; widespread.

MORACEAE ***Artocarpus altilis,*** Intr.; widespread. ***A. utilis,*** Intr.; widespread. ***Ficus lutea,*** Western Indian Ocean; widespread.

MUSACEAE ***Musa*** **spp.,** Intr.; widespread.

MYRTACEAE ***Eugenia uniflora,*** Intr.; M, N, P & Co. ***Psidium cattleianum,*** Intr.; widespread. ***P.guajava,*** Intr.; widespread.

ONAGRACEAE ***Ludwigia erecta*** Afr.; widespread. ***Ludwigia octovalvis*** Intr.; widespread.

ORCHIDACEAE ***Vanilla planifolia*** Intr.; widespread.

OXYLIDACEAE ***Averrhoa bilimbi*** Intr.; widespread.

PALMAE ***Cocos nucifera*** Indian Ocean; widespread. ***Latania lontoroides,*** Intr.; N.

PANDANACEAE ***Pandanus balfourii,*** End.; widespread. ***P. multispicatus,*** End.; widespread. ***P. utilis,*** Intr.; M, S, N, P & F.

PAPILIONACEAE ***Abrus precatorius*** Afr.-Asia; widespread. ***Canavalia cathartica*** Indo-Pacific; widespread. ***Desmodium incanum*** Intr.; widespread. ***D. triflorum*** Intro.; widespread. ***Indigofera suffruticosa*** Intr.; M, S, N & F. ***Teramnus labialis*** Pantrop.; widespread.

PASSIFLORACEAE ***Passiflora edulis,*** Intr.; M, S, N & B. ***P. foetida,*** Intr.; widespread. ***P. suberosa,*** Intr.; widespread.

POACEAE ***Axonopus compressus*** Intr?; M, S, N & F. ***Chloris barbata*** Intr.; M, L, N & F. ***Dactyloctenium ctenoides*** Pantrop; widespread. ***Digitaria radicosa*** Indo-Pacific; widespread. ***Echinochloa colonum,*** M, S, N, A. ***Elusine indica*** Intr?; widespread. ***Eragrostis tenella*** Intr?; widespread. ***Lepturus radicans,***

M, S, N, P, F. ***Oplismenus compositus*** Indo-Pacific; widespread. ***Panicum brevifolium*** Indo-Pacific; widespread. ***Paspalidium geminatum*** Palaeotrop.; M, S, N & F. ***Paspalum scrobiculatum*** Palaeotrop., M, L, S, N & F. ***Pennisetum purpureum*** Intr.; M, S, N, A & F. ***Saccharum officinarum,*** Intr.; S & N. ***Setaria barbata*** Intr?; M, S, N, A & F. ***Stenotaphrum dimidiatum*** Indo-Pacific; widespread. ***Urochloa paspaloides*** M, S, N

POLYGONACEAE ***Polygonum senegalense*** - Afr.; widespread.

PORTULACACEAE ***Portulaca oleracea*** - Indo-Pacific; widespread.

RUBIACEAE ***Guettarda speciosa*** Indo-Pacific; widespread. ***Morinda citrifolia*** Indo-Pacific; widespread. ***Pentodon pentandrus*** Afr.; widespread. ***Vangueria madagascariensis*** Intr.; M, S & N.

RUTACEAE ***Citrus reticulata,*** Intr. - M, S, N, P & B.

SAPINDACEAE ***Cardiospermum halicacabum*** Intr.; widespread.

SOLANACEAE ***Datura metel,*** Intr.; widespread.

STERCULIACEAE ***Heritiera littoralis*** Indo-Pacific; widespread.

TILIACEAE ***Triumfetta rhomboidea*** - Intr.; widespread.

TURNERACEAE ***Turnera angustifolia*** - Intr.; widespread.

TYPHACEAE ***Typha javanica*** Indo-Pacific; M, S, N, P & Cur.

UMBELLIFERAE ***Centella asiatica*** Intr.; widespread.

VERBENACEAE ***Lantana camara,*** Intr.; widespread. ***Phyla nodiflora*** Indo-Pacific; widespread. ***Stachytarpheta jamaicensis,*** Intr.; widespread. ***S. urticifolia,*** Intr.; widespread,

ANIMALIA

ANNELIDA

OLIGOCHAETA Sp.

MOLLUSCA

Family SUBULINIDAE ***Paropeas achatinaceum***..... Pantr.; most islands, ***Subulina octona*** Bruguiere - Pantrop.; most islands.

Family VAGINULODAE ***Vanigula seychellensis*** Fischer, 1871 - End.; M, S, N & P.

CRUSTACEA

DECAPODA

Family GRAPSIDAE ***Grapsus tenuicrustatus*** (Herbst, 1783) - Indo-Pacific; M, S, N & A.

Family OCYPODIDAE ***Ocypode ceratopthalma*** (Pallas) - Indo-Pacific; M, S, N, P, A, Co, Coe. ***O. cordimana*** (Desmarest, 1825) - Indo-Pacific; M,S, N, A, Co & Bird.

ISOPODA Sp.

ARACHNIDA

SCHIZOMIDA - sp.

ARANEAE

Family CLUBIONIDAE ***Clubiona*** sp.

Family CORINNIDAE ***Corinnidae*** sp. ***Oedignatha mogamoga*** Marples

Family CRYPTOTHELIDAE ***Cryptothele alluaudi*** Simon, 1893

Family GNAPHOSIDAE ***Xeropheus*** ? ***espoir*** Platnick, 1981

Family LYCOSIDAE ***Trochosa urbana*** (O. Pickard-Cambridge, 1878)

Family OCHYROCERATIDAE ***Theotima minutissima*** (Petrunkevitch, 1929)

Family OONOPIDAE ***Ischnothyreus peltifer*** (Simon, 1891). ***"Orchestina" seychellorum***

Family SALTICIDAE ***Myrmarachne constricta*** (Blackwall, 1877). ***Sadies*** ? ***fulgida*** Wanless, 1984

Family SCYTODIDAE ***"Scytodes" fusca*** (Walckenaer, 1837)

Family SELENOPIDAE ***Selenops secretus*** Hirst, 1911

Family TETRAGNATHIDAE ***Nephila inaurata*** (Walckenaer, 1841)

Family THERIDIIDAE ***Argyrodes cognatus*** (Blackwall, 1877). ***A. rostaratus*** Blackwall, 1877. ***Coleosoma floridana*** (Banks, 1900). ***"Theridion" clabnum*** Roberts, 1978

Family THOMISIDAE ***"Thomisus" stenningi*** Pocock, 1900

Family ULOBORIDAE ***Uloborus plumipes*** Lucas, 1846

ACARI - not identified.

AMBLIPYGI
Family TARANTULIDAE ***Charinus seychellarum*** Krapelin, 1898 - End.; M, Long, S, N, P, Fel & F.

MYRIAPODA
DIPLOPODA
Family PACHYBOLIDAE ***Trigoniulus corallinus*** (Eydoux & Souleyet, 1841) - Pantrop.; M, S, N, P, A, Fel.
Family PARADOXOSOMIDAE ***Orthomorpha coarctata***
Family PSEUDOSPIROBOLELLIDAE ***Paraspirobolus dictyonotus*** (Latzel, 1895) - Intro.; M, S & N.

CHILOPODA
Family GEOPHILIDAE ***Nesogeophilus leptochilus*** (Brölemann, 1931) - Asia; M, N, P, Cur, A.
Family SCOLOPENDRIDAE ***Scolopendra subspnipes***.Leach Pantrop.; M, S, N, P, A, Freg.

APTERYGOTA - spp.

HEXAPODA
ODONATA
Family AGRIONIDAE ***Ceriagrion glabrum*** (Burm., 1839) - Afr.; S, N, P & A.
Family LIBELLULIDAE ***Orthtrum stemmale*** (Selys, 1877) - Afr.; widespread. ***Pantala flavescens*** (Fabricius, 1798) - Afr.; widespread. ***Tramea limbata*** (Desjardins, 1832) - Indian Ocean; M, S, N, P & A.

ORTHOPTERA
Family ACRYDIDAE ***Paratettix histricus***
Family PHASGONURIDAE ***Conocephalus conocephalus*** Linnaeus, 1758; Afr.; widespread.
Family GRYLLOTALPIDAE ***Gryllotalpa africana***, Afr.; M, S, N & P.
Family GRYLLIDAE ***Trigonidium perpusillum*** Bolivar, 1912 - End.; M, S & N. ***Zarceus fallaciosus*** Bolivar, 1895 - End.; M, L, Anon, S, N & A.
Family TRIDACTYLIDAE - sp.

DICTYOPTERA
Family BLATTIDAE ***Lobopterella dimidiatipes*** (Bouvier, 1890) - Asia; M, L, S, N & A. ***Miriamrothschildea labrynthica*** (Bolivar, 1924) - End.; M, S & N. *Periplaneta americana* and ***Pycnoscelus indicus*** - Pantrop.; widespread.

ISOPTERA
Nasuitermes nigritus Mad.; widespread

DERMAPTERA
Family CARCINOPHORIDAE ***Euborellia annulipes*** (Lucas) - Intr.; M, S, N, A, LD & F.
Family LABIIDAE ***Gonolabis electra*** Burr - Intr.; M, S, N, P, C, A & LD.

HEMIPTERA
Family PENTATOMIDAE *Chinavia spicata*.

PSOCOPTERA - spp.

THYSANOPTERA - sp.

NEUROPTERA
Family MYRMELEONIDAE ***Myrmeleon obscurus*** Rambur, 1853 - Afr.; M, S, N & Bird.

LEPIDOPTERA

Family ARCTIIDAE ***Argina cribraria*** (Clerk, 1759) - Palaetrop.; M, S & N.
Family LYCAENIDAE ***Zizerina knysa*** (Trimen, 1862) - Afr.; M, S, N, P, Bird & D.
Family LYONETIIDAE ***Opogona sacchari*** (Bojer, 1856) - Intr.; M, S, N & A.
Family NOCTUIDAE ***Callopistria maillardi*** (Guenee, 1863) - Afr.; M, R, S, N & F.
Family PYRALIDAE ***Cirrochrista mulleralis*** Legrand, 1957 - End.; M, S, N & P.
Family PYRAUSTIDAE, ***Marasmia poeyalis*** (Boisduval, 1833) - Palaeotrop.; M, S & N. *Pycnarmon diaphana* Palaeotrop.; widespread. ***Syngamia abruptalis*** Palaeotrop; widespread.
Family SPHINGIDAE ***Cephonodes hylas*** (Linnaeus, 1771) - Afr.; M, S & N.
Amphixystis lactiflua,

DIPTERA

Family ANTHOMYIIDAE sp.

HYMENOPTERA

Family VESPIDAE ***Delta alluadui*** (Perez, 1895) - End.; M, S, N, P & D. ***Euodynerus seychellensis*** (Dalla Torre, 1904) - Masc.; M, S, N & P. ***Polistes olivaceus*** (De Geer, 1773) - Indo-Pacific; M, Moy, S, N, P, A & LD.
Family FORMICOIDEA ***Odontomachus similis*** - Mad.; widespread. ***Technomyrmex albipes*** (Smith, 1861) - Intr.?; widespread.

COLEOPTERA

Family BUPRESTIDAE ***Dicercomorpha alluaudi*** Kerremans, 1893 - End.; M, S, N & LD.
Family CERAMBYCIDAE ***Coptops humerosa*** Fairmaire - End.; M, S & N.
Family CURCULIONIDAE ***Cratops aureostriatus C. griseovestitus*** Linell, 1897 - End.; widespread.

CHORDATA

AMPHIBIA

Family RANIDAE ***Ptychadena mascariensis*** (Dumeril & Bibron, 1836) - Afr.; M, S, N, P, LD & F.

REPTILIA

Family GEKKONIDAE ***Gehyra mutilata*** (Wiegmann, 1835) - Intr.; widespread. ***Phelsuma sundbergi*** Rendahl, 1939 - End.; widespread. ***Urocotyledon inexpectata*** (Stein) - End.; widespread.
Family SCINCIDAE ***Mabuya seychellensis*** (Dumeril & Bibron, 1836) - End.; widespread.
Family TESTUDINIDAE ***Dipsochelys*** **sp.** - End.; formerly widespread. ***D. dussumieri*** (Gray, 1835) - Intr.; Cerf, N, Co, Coe, Cu & F.
Family TYPHLOPIDAE ***Rhamphotyphlops braminus*** (Daudin) - Intr; M, S, N, P, A, LD, F & Bird.

AVES

Family ARDEIDAE ***Butoroides striatus*** (lLinnaeus, 1758) - Pantrop.; widespread.
Family FALCONIDAE ***Falco araea*** Oberholser, 1904 - End.; M, Cerf, S, N, P, Fel, Mar & LD.
Family RALLIDAE ***Gallinula chloropusd*** (linn, 1758) - Cosmo.; widespread.
Family NECTARIDAE ***Nectarinia dussumieri*** (Hartlaub, 1860) - End; widespread.
Family PLOCEIDAE ***Foudia madagascariensis*** (Linnaeus, 1758) - Mad.; widespread.
Family STURNIDAE ***Acridotheres tristis*** (Linnaues 1766) - Intro.; widespread.

MAMMALIA - CHIROPTERA

Family PTEROPIDAE ***Pteropus seychellensis*** Milne Edwards, 1887 - Com.; M, S, N, P & LD.

ARTIODACTYLA

Family MURIDAE ***Rattus*** **sp.** - Intr.; widespread.
Family BOVIDAE ***Bos taurus*** Linnaeus 1758 - Intr.; N. ***Capra hircus*** Linnaeus, 1758 - Intr.; N.

The distribution of the yellow bittern *Ixobrychus sinensis* in Seychelles

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Abstract: The Seychelles islands support the most westerly populaiton of yellow bitterns. Slight morphometric differences exist between the Seychelles birds and other populations, but samples are too small to allow reliable comparison. The species has a restricted distribution in Seychelles with signficant popualtions on Mahé, Praslin and La Digue.

Keywords: marsh, morphometrics, Mahé, Praslin, La Digue

The yellow bittern *Ixobrychus sinensis* (Gmelin) is a widespread species in south Asia, extending from India to China, the Philippines and parts of Micronesia. The population in the Seychelles islands is the most westerly and is isolated from all others by some 3,000km of open ocean. Although this population may seem to be a biogeographical anomaly there is a strong Asian influence on the Seychelles and western Indian Ocean avifauna (Benson 1984), due in part to the predominance of a southern African-Asian migratory route (Feare & Watson 1984; Phillips 1997). Indeed, a number of migratory species have been recorded in Seychelles and nowhere else in the entire Afro-Malagasy region including three other water birds, white-breasted waterhen *Amaurornis phoenicurus* (Pennant), Indian pond-heron *Ardeola grayii* (Sykes), (Skerrett 1994) and cinnamon bittern *Ixobrychus cinnamomea* (Gmelin) (Lucking 1995). In addition, northern populations of yellow bittern are long distance migrants, which may explain colonisation of remote islands including not only Seychelles, but also some Pacific islands, such as Palau, Guam and the Caroline Islands.

It has been suggested that the colonisation of the islands Seychelles by yellow bitterns is believed to be relatively recent (Benson 1970) as there are no significant morphological differences between Seychelles and Asian specimens (Benson 1970) although the Seychelles specimens have been suggested to be paler on the neck (Hartert 1920) and females do have slightly shorter tarsi than Asian birds (Benson 1970). These morphometric differences are relatively minor and colouration may be too variable to be a useful taxonomic character (Salomonsen 1934). It is notable that although Benson (1970) was unable to detect signifi-

cant differences between the Seychelles birds and the 31 Asian specimens available to him, comparison with larger series shows the Seychelles birds to be at the upper limit of the size range (Table 1). This is to be expected from a highly isolated population with a strong founder effect. Future genetic drift may be expected to result in the development of more distinctive differences. On the other hand it should be noted that there may have been continued gene flow from occasional vagrants to Seychelles since the first colonisation. Vagrant records from Australia and Christmas Island, Indian Ocean, illustrate the propensity for this species to stray from traditional migration routes. Occasional new arrivals might be partly responsible for the apparent lack of morphological divergence between Seychelles birds and those of Asia. If this is the case, the length of time Seychelles has been colonised by yellow bitterns might conceivably be considerably greater than generally assumed.

Distribution

The species was first collected on 26th January 1867 on Mahé (Newton 1867; as '*Ardeola lepida*') in an extensive marsh on the north-west coast (corresponding to Beau Vallon). Further specimens were collected on Mahee in 1877, without precise locality (Salomonsen 1934; Benson 1970). Since then the species has been recorded regularly in marshes around Mahé and in the Mare Soupape marsh on La Digue. The first studies of the bird were made in 1975-78 (Watson, 1980) when data were collected largely incidentally during a study of the endemic avifauna. Bitterns were observed at twelve sites on four islands (including the first reports from La Digue and Curieuse) and the population was estimated at "certainly fewer than 100 pairs". There are no subsequent records from Curieuse and this is believed to have been a temporary record. Similarly transient visitors were recorded in 1999 on Aride (at least 3 individuals) (Bowler & Hunter 2000).

Over recent years we have accumulated records of bitterns and have used these to estimate the total population (Gerlach & Skerrett 2001). Further details of the populations are given below.

Distribution

7 marshes were found to be inhabited on Mahé; North-east point, Beau Vallon, Roche Caiman Bird Sanctuary, Anse Gouvernment, Anse Intendance, Police Bay and Anse a la Mouche. This last site was not included in Gerlach & Skerrett (2001) as it was only

Table 1. Summary of morphometric data on Seychelles and Asian yellow bitterns

Origin	Collector	Sex or number	Wing (mm)	Culmen (mm)	Tarsus (mm)	Source
Seychelles	Newton	m	146	57	52	Benson, 1970
		f	130	53	44	Benson, 1970
	Lantz	m	130	58	49	Benson, 1970
		m	134	58	49	Benson, 1970
		f	133	56	44	Benson, 1970
Asia		18 m	128-131.9-136	53-56.0-63	42-48.6-53	Benson, 1970
		13 f	125-131.7-146	53-57.2-61	46-48.4-51	Benson, 1970
India			129-134-143	49-52-57	44-51	Ali & Ripley, 1968
SE Asia		41	125-141	50.2-56.9	44-51	Wells, 1999

reported subsequently, breeding has been reported at this site (G. Berke pers. comm.). Bitterns were recorded in the *Polygonum senegalense* thickets at North-east point. This site was visited on several occasions and the number of bitterns observed varied from 1 to a maximum of 8. Bitterns were located in two areas of the Beau Vallon marsh system; the *Eleocharis dulcis* reedbed by the Fisherman's Cove Hotel (up_to 6 birds) and a small woodland pool fringed by *Polygonum senegalense* in the Riviere Mare Anglaise (a single sighting of one bird). Roche Caiman Bird Sanctuary was colonised by bitterns in 1995, nests were located in 1996 and up_to 3 birds were recorded. At Anse Gouvernment bitterns have been observed feeding along the edge of *Acrostichum aureum* fringing a deep marsh. Access to the *A. aureum* is difficult and no detailed surveys have been made. A maximum of 4 birds have been seen. At Anse Intendance, 2 bitterns were located on one occasion north of the beach access road at a small woodland pool. Subsequent searches failed to locate further birds, but access to the area is difficult due to the density of vegetation and the marshy ground. Police Bay is the largest surviving wetland on Mahé and one of the few with no water lettuce *Pistia stratiotes* or water hyacinth *Eichornia crassipes*. The margins of the marsh are dominated by *Acrostichum aureum*. An extensive search of the area was made for bitterns and 6 birds located. Despite the size of the marsh, density appears to be lower than elsewhere partly because much of the total area is open water. Salinity, due to invasion of the marsh by high tides may also reduce the value of the marsh to some extent.

The previous study of bittern distribution recorded their presence in 7 marshes (North-east Point, Barbarons, Anse aux Pins, Baie Lazare, Anse Forbans, Anse Takamaka and Police Bay). Of these, four are included in the present study. The other three have been visited but without detecting any bitterns. Reed marsh areas of Barbarons and Anse aux Pins have been drained since Watson's study and are no longer suitable for bitterns. Anse Forbans is a significant area of *Eleocharis dulcis* reedbed. It has been visited and explored thoroughly on several occasions but without locating bitterns. The site is heavily disturbed by agriculture and by dogs from surrounding suburban areas. These factors may currently exclude bitterns from what would be expected to be a good site.

A single locality has been found on Praslin, the Anse Kerlan marsh. Only a small part of the extensive *E. dulcis* reedbed could be examined at any one time and much of the marsh was inaccessible. The only bitterns observed were those flying up from the marsh, all of these were casual movements and would represent a small proportion of the total population. Between 2 and 6 birds were seen on each visit. Part of this area has been developed for a golf course and most of the marsh has been in-filled. However, since late 2000 bitterns have returned to inhabit artificial wetlands created by this development. Bitterns nave been recorded at Anse Madge, this site has now been drained and is unsuitable habitat.

On La Digue bitterns were recorded in clumps of *Typha javanica* in and around the Mare Soupape on La Digue. No more than two individuals were seen at any one time. Bitterns have been recorded at Grand Anse. The site contains a small area of *Achrostichum aureum* marsh which could support a small population, although none have been recorded recently. The back of the marsh which will have supported reedbeds in the past is now agricultural.

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Orchid surveys in anthropised forests of Madagascar

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Abstract: The diversity of orchids was studied in the Beforona region of Madagascar. Signficant differences were found between near-primary , selectively logged and burnt forest. These differences relate to the types of orchids present rather than total numbers. Some species are heavily exploited and suggestions made for their sustianable use.

Keywords: conservation, epiphytes, exploitation, forest, Orchidaceae

Considered as a micro-continent, Madagascar has in general four distinct bioclimatic subdivisions, specifically the eastern, central, western and southern domains (Humbert 1965). The flora of Madagascar has a predominance of woody taxa and is well known for its high level of endemism. For orchids alone, nearly 90% are endemic (Du Puy *et al.* 1999).

The eastern domain has many remarkable forests which are currently threatened by slash and burn agriculture and logging. Before being burnt, the humid forests of the eastern region are usually logged by different stakeholders interested in timber and non-timber forest products. The present study was conducted in the eastern domain of Madagascar.

Methods

The main objective of the study was to assess the level of forest use by the local population. The present article is focused on orchids. Inquiries revealed that all the consumed forest products are removed before the conversion of the forest to agricultural use. Inventories of orchids were carried out in different types of forests. The study was conducted specifically in a watershed (900 ha) located in Beforona region, east escarpment of Madagascar (Fig. 1). The differentiation of the forest was done with aerial photographs and according to the crown closure/crown cover chart proposed by Howard (1991). According to the textures encountered on the photographs and the results of field verification three types of forests were identified: a) near-primary forest; b); selectively logged forest and c) degraded forest. One plot of 1 ha was assessed in each forest type. Orchids were identified to species level as far as possible, otherwise to generic level.

The characterisation of orchids is based on their way of growing. Epiphytic characterises a plant growing over another plant without taking nutrition from the support plant. By opposition to epiphytic plants terrestrial plants grow on the ground.

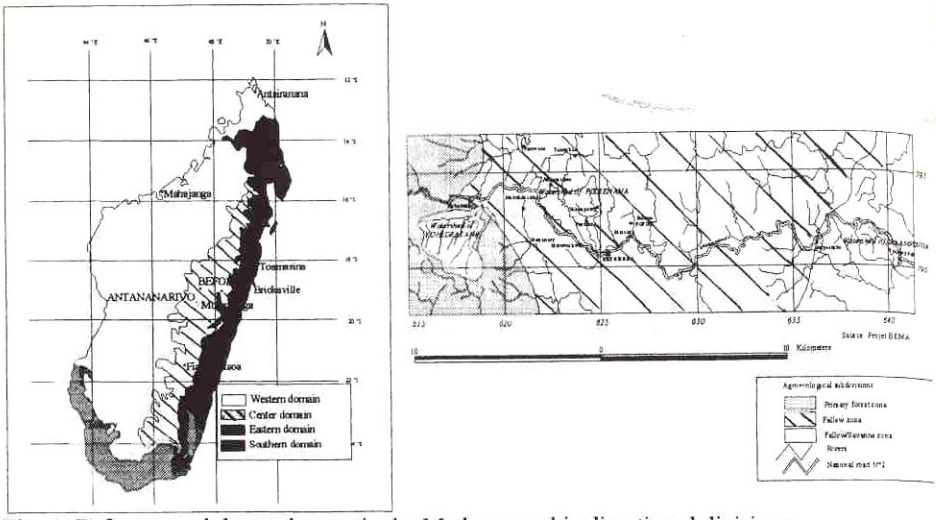

Fig. 1. Beforona and the study area in the Madagascar bioclimatic subdivisions (after Humbert 196).

Results

1. Near-primary forest:

In this forest 266 plants were located, divided into 40 species. Floristic diversity is defined as the manner in which species are distributed between individual inventories (Fournier & Sasson 1983). This floristic diversity is shown in table 1. 11 genera were identified most of which are epiphytic plants. 56% of the total number of plants are constituted by six species which are dominant in number. These species are represented by their percentage in Fig. 2. All of these species are epiphytes. Of the 40 species in this forest type, 15 were encountered only once. They constituted 6% of the total number. Three of them are sold frequnetly by the local population because of their monetary value: *Aerangis citrata*, *Angraecum rostratum* and *Beclardia macrostachya*.

2. Selectively logged forest:

In this forest 196 plants were located, divided into 28 species. The floristic diversity is shown in table 2. 7 genera were identified most of which are epiphytic plants. 51% of the total number of plants are constituted by three species which are dominant in number. These species are represented by their percentage in Fig. 3. All of the dominant species are epiphytes. Of the 28 species , 11 were encountered only once. They constituted 6% of the total.

3. Degraded forest:

In this forest 255 plants were located divided into 37 species. This floristic diversity is shown in table 3. 12 genera were identified, most of which are epiphytic plants. 52% of the total number of plants are constituted by three species which are dominant in number. These species are represented by their percentage in Fig. 4. All of the dominant species are epiphytes. Among the 37 species, 13 were located once, constituting 6% of the total number.

Table 1. Floristic diversity of orchids in near-primary forest

Genus	Number of species	Number of plants	Characteristic
Aerangis	2	2	Epiphytic
Aeranthes	4	5	Epiphytic
Angraecum	13	94	Epiphytic or terrestrial
Beclardia	1	1	Epiphytic
Bulbophyllum	8	107	Epiphytic or terrestrial
Calanthe	1	2	Terrestrial
Cynosorchis	2	6	Epiphytic
Jumellea	5	43	Epiphytic
Lyparis	1	2	Terrestrial
Oenia	1	1	Epiphytic
Polystachia	2	3	Epiphytic
Total	40	266	

Table 2. Floristic diversity of orchids in selectively logged forest

Genus	Number of species	Number of individuals	Characteristic
Aeranthes	5	47	Epiphytic
Angraecum	7	55	Epiphytic or terrestrial
Bulbophyllum	8	67	Epiphytic or terrestrial
Jumellea	5	24	Epiphytic
Oberenia	1	1	Epiphytic
Oenia	1	1	Epiphytic
Phaius	1	1	Epiphytic
Total	28	196	

Table 3. Floristic diversity of orchids in degraded forest

Genus	Number of species	Number of individuals	Characteristic
Aerangis	3	7	Epiphytic
Aeranthes	5	11	Epiphytic
Angraecum	8	62	Epiphytic or terrestrial
Bulbophyllum	9	120	Epiphytic or terrestrial
Cirrhopetalum	1	3	Terrestrial
Cynorkis	1	1	Terrestrial
Gussonia	1	3	Epiphytic
Jumellea	3	7	Epiphytic
Liparis	1	4	Epiphytic
Oberonia	1	3	Epiphytic
Oenia	1	1	Epiphytic
Polystachia	3	3	Epiphytic
Total	37	225	

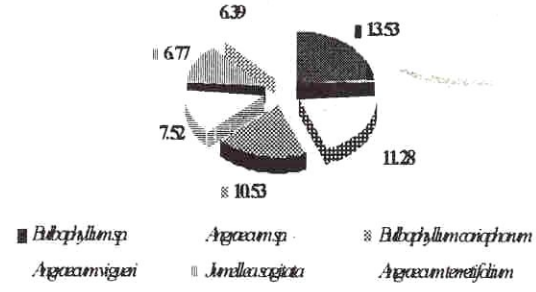

Fig. 2. Orchids: most abundant species in near-primary forest

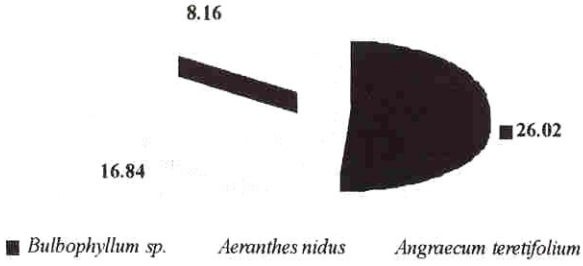

Fig. 3. Orchids: most abundant species in selectively logged forest

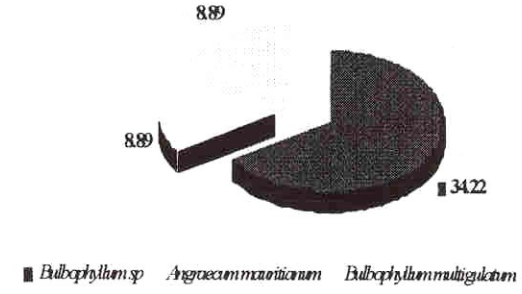

Fig. 4. Orchids: most abundant species in degraded forest

Table 4. Synthesis

Type of forest	Near-primary forest	Selectively logged forest	Degraded forest
Size of plants assessed	266	196	225
Size of species assessed	40	28	37
Size of dominant species	6	3	3

Discussion

The three types of forest are compared in Table 4. The data show that more orchids were located in near-primary forest than other forest types. The number of orchids located in each forest is not related to its state of perturbation. Catgeorization of the state of perturbation may be refined if criteria other than the crown cover were to be taken into account, such as the health of orchids.

In all cases most of orchids have rhizomes which creep along the supporting tree (for epiphytic orchids) or below the ground (for terrestrial orchids). Rhizomes are modified stems, generally with nutritive reserve accumulation properties. A synopsis of the characters is describe below for each genus identified. Descriptions are taken from Cullen (1992) and Du Puy (1999).

Aerangis:

Habit: monopodial epiphytes with short, compressed stems
Leaves: leathery, unequally 2-lobed at the apex
Inflorescence: racemes with 7 to many flowers, hanging from the leaf axilis, bracts small, brownish
Flowers: usually white, fragrant

Aeranthes:

Habit: epiphytes
Leaves: leathery
Inflorescence: racemes
Flowers: many

Angraecum:

Habit: monopodial epiphyte with long or short stems
Leaves: variable in 2 rank,
Flowers: variabily resupinate or not, solitary in the leaf axils, or in axillary racemes

Beclardia:

Habit: epiphytes
Leaves: leathery
Inflorescence: racemes
Flowers: many

Bulbophyllum:

Habit: epiphytic or terrestrial
Pseudobulbs: simple, distant or clustered
Leaves: stalked or stakless, leathery
Flowers: many, in spikes, racemes or umbels

Calanthe:

Habit: usually terrestrial
Pseudobulbs: usually inconspicuous, more rarely large and grooved
Leaves: large, thin, pleated, rolled when young, mostly evergreen
Inflorescence: racemes, araising from the leaf axilis
Flowers: many

Cirrhopetalum:

Habit: epiphytic
Pseudobulbs: simple, distant or rarely clustered
Leaves: large, 2 cm or more
Flowers: solitary

Cynokis :

Habit: terrestrial
Inflorescence: racemes
Flowers: few to many

Jumellea:

Habit: epiphytic or terrestrial
Leaves: leathery
Inflorescence: racemes arising from the leaf axilis
Flowers: few to many

Liparis:

Habit: terrestrial, perennial herbs, growing on rocks or epiphytic
Leaves: membranous or leathery, pointed at the base or not
Inflorescence: raceme
Flowers: few to many

Microcoelia:

Habit: epiphytic
Leaves: membranous or leathery
Inflorescence: racemes
Flowers: many

Oberenia:

Habit: epiphytic
Leaves: leathery,
Inflorescence: raceme
Flowers: many

Oenia:

Habit: epiphytic
Leaves: leathery

Phaius:

Habit: terrestrial or epiphytic
Inflorescence: raceme
Flowers: Few to many

Polystachia:

Habit: epiphytic
Pseudobulbs: variable, simple, ovoid, bearing 2 or more leaves
Inflorescence: raceme or panicle
Flowers: many

Endemism level was determined according to De La Bathie (1939), the result is shown in Fig. 5. The total list of all orchids assessed in the watershed is given in the appendix with their distribution according the endemicity of the genus. For all forest types, 51 species were identified, of which 30 are endemic to Madagascar; 5 are endemic to the eastern region and 16 have a wide distribution in Mascarenes. The others 8 species were probably introduced and naturalised in Madagascar.

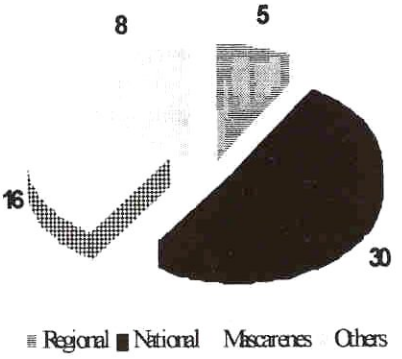

Fig. 5. Surveyed orchids divided into their levels of endemism

The stakeholders using the natural forest includes the local population, who depend on forest products (timber and non timber). Concurrent to inventories, surveys in 11 villages were conducted to determine the importance of orchids (as non-timber forest products) to the local population. The aim was to discover whether or not orchids represent an important extra income. According to this survey 31% gathered orchids in the forest as a commercially valuable product. Orchids are still available in the region and so the local population does not have an interest in keeping them in a nursery for reproduction. Nevertheless, their ecology (flowering periods, symbioses between host and orchids, parasites, light requirements, etc.) are known in general by them. Even if all the exploited species can be reproduced easily by vegetative means using the pseudobulb, the technical base is not well controlled by the local population at present. The local population ise interested in gathering orchids in various area sinside the forest and in caring for a while for those species that can be sold easily.

Currently in Madagascar, some specialist research institutions are successfully working on the reproduction of orchids (DEF 1987). At a global level, orchid artificial reproduction is very successful (Cullen 1992), although the natural ecology of orchids is not well known and available data are largely based on dispersed observations by amateurs (Sandford 1978).

For the future of orchids it is important to work with the local population. Instead of collecting the forest species that can be sold easily, it should be more productive for locals to keep and propagate them in nurseries. Nevertheless, they need a basic training for such activities. So, creating a program aiming at both the protection of orchids and their reproduction, and at the same time helping the local population is of great interesting.

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Appendix: List of all orchids assessed in the watershed

Number	Species	Endemism level			
		Regional	National	Mascarenes	Others
1	*Aerangis alata*	0	1	0	0
2	*Aerangis citrata*	0	1	0	0
3	*Aerangis fuscata*	0	1	0	0
4	*Aerangis* sp.	0	1	0	0
5	*Aeranthes caudata*	0	0	0	1
6	*Aeranthes nidus*	0	1	0	0
7	*Aeranthes peyrotii*	0	0	0	1
8	*Aeranthes ramosa*	0	1	0	0
9	*Aeranthes sagitata*	0	0	0	1
10	*Aeranthes* sp.	0	0	0	1
11	*Angraecum compactum*	1	1	0	0
12	*Angraecum cultriformis*	0	1	0	0
13	*Angraecum didieri*	0	0	1	0
14	*Angraecum elephantianum*	0	1	0	0
15	*Angraecum ferkoanum*	0	1	0	0
16	*Angraecum germinyanum*	0	1	0	0
17	*Angraecum humblotianum*	0	1	0	0
18	*Angraecum mauritianum*	0	0	1	0
19	*Angraecum mauritianum*	0	0	1	0
20	*Angraecum nigriflorum*	0	0	0	1
21	*Angraecum pachapus*	0	0	0	1
22	*Angraecum panicifolium*	1	1	0	0
23	*Angraecum rostratum*	0	1	0	0
24	*Angraecum sedifolium*	0	1	0	0
25	*Angraecum* sp.	0	0	1	0
26	*Angraecum teretifolium*	0	1	0	0
27	*Angraecum viguieri*	0	0	0	1
28	*Beclardia macrostachya*	0	0	1	0
29	*Bulbophyllum alexandrae*	0	0	1	0
30	*Bulbophyllum coriophorum*	0	0	1	0
31	*Bulbophyllum leandrianum*	0	0	1	0
32	*Bulbophyllum longiflorum*	0	0	1	0
33	*Bulbophyllum nigriflorum*	0	1	0	0
34	*Bulbophyllum obtulabium*	0	1	0	0
35	*Bulbophyllum occlosum*	0	1	0	0
36	*Bulbophyllum occultum*	0	0	1	0
37	*Bulbophyllum ochrochlamys*	0	1	0	0
38	*Bulbophyllum pachypus*	0	1	0	0
39	*Bulbophyllum* sp.	0	0	0	1
40	*Calanthe madagascariensis*	0	1	0	0
41	*Cynorkis* sp.	0	0	1	0
42	*Cynorkis uncinata*	0	1	0	0
43	*Gussonea macranta*	0	1	0	0
44	*Jumellea arborescens*	0	1	0	0
45	*Jumellea intricata*	0	1	0	0
46	*Jumellea maxillarioides*	0	1	0	0
47	*Jumellea punctata*	1	0	0	0
48	*Jumellea sagittata*	0	1	0	0
49	*Jumellea* sp.	0	0	1	0
50	*Jumellea teretifolia*	0	1	0	0
51	*Liparis bulbophylloides*	0	1	0	0

Appendix (cont.): List of all orchids assessed in the watershed

Number	Species	Endemism level			
		Regional	National	Mascarenes	Others
52	*Oberonia disticha*	0	0	1	0
53	*Oenia volucris*	0	0	1	0
54	*Phaius pulchellus*	1	0	0	0
55	*Polystachya rosellata*	0	0	1	0
56	*Polystachya* sp.	0	0	1	0
57	*Polystachya virescens*	1	0	0	0
TOTAL		**5**	**30**	**16**	**8**

'Extinct' species rediscovered in Mauritius

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An individual of *Trochetia parviflora* Bojer ex Baker (Sterculiaceae), a Mauritian endemic species not seen in the wild for 138 years, was discovered in April 2001. The plant, a healthy bush two metres tall and bearing at least 300 immature fruits was found by a team of the Mauritius Herbarium in a nature reserve on the Corps de Garde Mountain, south west of Port Louis the capital city. It is growing in a region of steep cliffs towards the lower reaches of the mountain's western scarp in association with several native species characteristic of dry forests.

The botanist Du Petit Thouars discovered the species during his stay in Mauritius ca. 1794 (Du Petit Thouars 1811). His specimen, without locality and bearing ripe fruits, is kept in the Paris Museum (Bosser *et al.* 1987). The plant must have een rare even then since it was found only twice thereafter; first in the 1830s on Montagne du Pouce, then in March 1863 by P. Ayres on Montagne Ory south of Port Louis (Bosser *et al.* 1987). Despite repeated surveys conducted in its known geographical range, the species could not be found again. Indeed it is probable that it is now extinct in the mountains around Port Louis. The rediscovered plant was found outside the known range of the species, at some 6km to the south west of the closest known historical site of the plant.

The genus *Trochetia* is endemic to Mauritius and Réunion and comprises 6 species (Mabberley 2000). Five are confined to Mauritius and one to Réunion (Bosser *et al.* 1987). *Trochetia* is a well known genus in Mauritius since one of the species, *T. boutoniana* was, in 1992, declared as the National Flower. Indeed, *Trochetia* spp. have beautiful flowers and although only two species are in cultivation, Bosser *et al.* (1987) considers that all deserve to be used as horticultural small trees. It is interesting to note that *T. parviflora* did make an appearance in the list of plants cultivated in the Jardin des Pamplemousses (Cantley 1880). It was however never to be mentioned again in the succeeding inventories (Anon. 1926, Rouillard & Guého 1999) indicating a very short lived presence in cultivation. Half a century or so after the last record of a live plant, the species was said to be "very rare" (Vaughan 1937), then "on the brink of extinction" (Vaughan, 1958). Several botanists were still conserving the hope that the plant could one day be rediscovered on the slopes of Montagne du Pouce (Friedmann *et al.* 1979, Bosser *et al.* 1987). But 130 years after the last sighting in the wild, the species was finally classified as extinct (Strahm 1993). Since the rediscovery, the team of the Mauritius Herbarium intensified its efforts to find further plants on the Corps de Garde mountain and to date the known wild population stands at 73 individuals.

It is interesting to note that the species which was described as "a much branched

low shrub" (Baker 1877) could in fact grow to over 4m high with a basal diameter of 30cm. Furthermore, although the plant's flower had been seen (Bojer 1837), it seems its colour was not noted. This led to some speculations that the flowers were reddish (Vaughan 1937) or red (Vaughan 1958). All the flowers we found were white with a slight tinge of pink along the edges of the petals. The nectar, observed only on an old flower, is brown.

Although a number of the plants found are juveniles of all stages indicating a fairly good natural regeneration, ecological data collected is unravelling a worrying trend. It seems that competition with alien weeds like *Schinus terebinthifolius* Raddi and *Hiptage benghalensis* (L) Kurz is gradually pushing the *T. parviflora* plants to regenerate primarily in the steepest regions of the mountain. These areas may not only be suboptimal habitats for the plants but could also increase the risks of extinction of the population due to stochastic factors because such places would experience a greater incidence of landslides. Furthermore, effects of any drought can be expected to be more pronounced on plants pushed to grow in steeper and more rocky environment. Another concern is that all known wild *T. parviflora* belong to a single population, a situation that would greatly enhance chances of extinction in the event of a disease or fire striking the area. It seems therefore that conservation action is essential to ensure the survival of both the population and the species. A project proposal submitted for funding to the Chicago Zoological Society via the IUCN/SSC Indian Ocean Islands Plant Specialist Group has been approved and US$ 2,500 secured for a first conservation management intervention to save the species. The ultimate aim is to restore a self-sustaining *in-situ* population and establish safeguard populations in arboreta and botanical gardens. The first step would be the control of alien weeds in the immediate vicinity of the plants while stocking up seedlings in nurseries of the Mauritius Herbarium, Forestry Services and National Parks and Conservation Services. At a later stage, it is planned that larger areas of forest be weeded to make them suitable for the establishment of new colonies that would help reduce extinction risks from stochastic factors thus ensuring long-term *in situ* survival. The conservation of this species would be an excellent opportunity to further conservation awareness in Mauritius given both the emblematic name of the plant as well as its high horticultural value due to its exquisite flowers.

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NOTES

Seychelles fineliner damselfly not extinct after all

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The delicate little Seychelles damselfly *Teinobasis alluaudi* (Martin, 1896) was feared extinct, not having been seen since 1909. It was recorded from Mahé in 1894 and 1909 (at Mare aux Cochons) and on Silhouette in 1908 (Mare aux Cochons and Pointe Etienne) (Martin 1896; Campion 1909). On 27th June 1997 it was rediscovered on southwestern Mahé, by a small stream in *Terminalia* forest, at sea level. It is clearly threatened because at the turn of the 20th century it was described as "fairly common on Mahé island" (Martin 1896), but with the land transformations that have taken place that is not the case today. It is hanging on apparently in partly shaded streams that have no or little agricultural run-off. Further encouraging discoveries have been made on Silhouette. Dr. Justin Gerlach found the species at Anse Patates on 28th July 1998, at Belle Vue in July 2000 (also observed by Chris and Bill Wain on 18th July 2001), and David Simpson and Audrey Royo located it on 24th May and 14th June 2001 at Grande Barbe. Two other sites have been found on Mahé by Chris and Bill Wain, on the Grande Anse River on 29th October 2000 and at the Plantation Club grounds on 28th July 2001.

This species, like so many stream organisms, appears to be very vulnerable to impacts that are taking place upstream. It makes one realise how important it is to conserve catchments and not simply patches of forest.

As a result of these recent discoveries the species has been downlisted to 'Vulnerable' (B2ab (ii & iii)) (Samways 2002) from its earlier categorisation of 'Critically Endangered'.

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NOTES

New Odonata records from Seychelles 1998-2000

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During the period 1998-2000, a record was kept of all Odonata species observed on Aride Island. In addition, detailed notes were taken of all Odonata identified during visits to other granitic islands. Individual dragonflies and damselflies were identified by using the definitive key for Seychelles (Blackman & Pinhey 1967), in combination with notes recorded in Aride Island annual reports (RSNC unpubl.) by earlier wardens on the the island. Help with the identification of species newly recorded for Aride during the period, was kindly given by Bill and Chris Wain.

Consultation of the distribution table in Blackman & Pinhey (1967) and more recent reports on the Odonata of particular islands (e.g. Wain & Wain 1998, Wain *et al.* 1999), revealed that a number of observations represented new records for the islands concerned. These included all records from the islands of Aride and Grande Soeur, neither of which featured in the review by Blackman & Pinhey (1967), together with additional records from Praslin, La Digue and Curieuse. The records from Aride were included in the full species list for the island (see Bowler *et al.* 2000), but are included here for completeness).

Notes on the observations of new species for each island are recorded below. Nomenclature is modified from Wain & Wain (1998).

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Island	Species	Notes
Aride island	Common pond damsel *Ceriagrion glabrum*	breeding confirmed, seasonally common
	Marsh bluetail *Ischnura senegalensis*	recorded Nov. 1997 only by Wain & Wain
	Pygmy whisp *Agricnemis pygmaea*	recorded 1995-96 only, by Clive Read
	Sky-blue percher *Diplacodes trivialis*	egg-laying observed, seasonally common
	Black percher *Diplacodes lefebvrii*	rare annual visitor
	Striped skimmer *Orthetrum stemmale wrightii*	egg-laying observed, seasonally common
	Ghost duskdarter *Zyxomma petiolata*	egg-laying observed, small numbers all year
	Globe skimmer *Pantala flavescens*	egg-laying observed, small numbers all year
	Amberwing emperor *Anax guttatus*	egg-laying observed, absent during dry spells
	Vagrant emperor *Anax ephippiger*	regular migrant Dec.-Apr.
	Voyaging glider *Tramea continentalis*	egg-laying observed, seasonally common
	Phantom flutterer *Rhyothemis semihyalina*	regular migrant May-Dec.
	Twister *Tholymis tillarga*	egg-laying observed, absent during dry spells
Grande Soeur (May 1999)	Common pond damsel *Ceriagrion glabrum*	pairs in tandem around main marsh
	Sky-blue percher *Diplacodes trivialis*	several around main marsh
	Striped skimmer *Orthetrum stemale wrightii*	several on plateau
	Globe skimmer *Pantala flavescens*	several over plateau
Praslin	Sky-blue percher *Diplacodes trivialis*	commonly seen roadside channels, Grand Anse
	Amberwing emperor *Anax guttatus*	several at Lemuria resort May 2000
	Phantom flutterer *Rhyothemis semihyalina*	regular sightings roadside channels, Grand Anse
La Digue	Marsh bluetail *Ischnura senegalensis*	several seen Grand Anse May 1998 and Petit Anse Oct. 2000
	Sky-blue percher *Diplacodes trivialis*	commonly seen around many wetlands
	Amberwing emperor *Anax guttatus*	single males at Grand Anse and near Source D'Argent May 1998
	Voyaging glider *Tramea continentalis*	several at west plateau & Grand Anse wetlands
	Brunette chaser *Rhyothemis semihyalina*	common Grand Anse and Petit Anse May 1998
Curieuse (Doctor's House - Tortoise pens, January 2000)		
	Common pond damsel *Ceriagrion glabrum*	several seen
	Sky-blue percher *Diplacodes trivialis*	common
	Striped skimmer *Orthetrum stemmale wrightii*	common
	Globe skimmer *Pantala flavescens*	small numbers seen
	Voyaging glider *Tramea continentalis*	small numbers seen
	Phantom flutterer *Rhyothemis semihyalina*	small numbers seen

NOTES

IUCN Southern African Invertebrates Specialist Group

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The IUCN Red List has immense currency as it lists globally threatened species. On the list all species are equal, with equal space being given to whale and worm. But whereas we have much information on vertebrates, we have very little on invertebrates, especially their geographical ranges (both extent of occurrence and area of occupancy) and the threats to them. For some of the larger, more conspicuous taxonomic groups such as grasshoppers, dragonflies and snails there are Specialist Groups dedicated to them, but this leaves out many of the smaller or less well-known groups. This vacuum is now being filled by a regional group, covering 'Southern Africa' with no sharply defined geographical limits. Such a regional approach could easily of course by-pass some ecologically and phylogenetic important geographical islands. Such is the case with Seychelles. Although closer to East Africa, and until such time that there is an East African Invertebrates SG, and in view of the substantial work going on there, the importance of the biota globally, and the Gondwana link, there is merit in the Seychelles falling in the Southern African SG.

One of the important tasks of the Southern African Invertebrate SG is that it can act as a Red-Listing Authority. That is, it can act as a clearing house for getting thoroughly-assessed (using the new Red List categories of threat) invertebrates globally Red Listed (in addition to appearing in a national Red Data Book). Other tasks of the Southern African Invertebrates Group would be development of an Action Plan and promotion of public awareness. These would have the advantage of having the bona fide and weight of the IUCN behind them.

All this takes time, and one of the first aims is to document the species we have and the possible threats to them. Any information on the behaviour, ecology and conservation status of invertebrates on any of the Seychelles islands is most welcome. The archipelago representative is Justin Gerlach of The Nature Protection Trust of Seychelles (e-mail: *jstgerlach@aol.com*) through whom Seychelles information and queries should be directed. Chairman of the South African Invertebrates Group is Michael Samways, based at the Invertebrate Conservation Research Centre, University of Natal, South Africa (e-mail: *samways@nu.ac.za*).

Preliminary list of the marine shells (Mollusca: Gastropoda, Bivalvia) of Cousine Island, Seychelles

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This article provides a preliminary species list of marine Mollusca (Gastropoda and Bivalvia) collected from Cousine Island, Seychelles (4° 20'S; 55° 40'E), between 16 February 1998 and 9 April 1998. All shells were collected by, and are housed in the private collection of J. Lawrence. D. Steyn identified the specimens. 104 specimens, totaling 53 taxa were collected. Several of the specimens showed signs of extensive wear. As a result, species for which identification was not certain are indicated by (?). In other cases the specimens were only identified to the generic level. Juvenile specimens are indicated by (jv). The species list is as follows:

Phylum: **MOLLUSCA**

Class: BIVALVIA
Family: ARCIDAE *Barbatia foliata* (Forsskal, 1775).
Family: CARDIIDAE *Trachycardium elongatum* (Bruguière, 1789).
Family: LUCINIDAE *Codakia tigrina* Linnaeus, 1758.

Class: GASTRAPODA
Family: BUCCINIDAE *Cantharus undosus* (Linnaeus, 1758).
Family: BULLIDAE *Bulla ampulla* (Linnaeus, 1758).
Family: CERITHIIDAE *Clypeomorus petrosum* (Wood, 1828).
Family: CONIDAE *Conus canonicus* Hwass, 1792.
C. catus Hwass in Bruguière, 1792.
C. chaldaeus (Röding, 1798).
C. ebraeus Linnaeus, 1758.
C. geographus Linnaeus, 1758.
C. miliaris Hwass in Bruguière, 1792.
C. rattus Hwass in Bruguiére, 1792.
C. striatus Linnaeus, 1758 (?).
C. tulipa Linnaues, 1758.
C. violaceus Gmelin, 1791.
C. vitulinus Hwass, 1792 (jv)(?).
Family: CORALLIOPHILIDAE *Coralliophila monodonta* (Blainville, 1832).

Family: CYPRAEIDAE *Cypraea argus* Linnaeus, 1758.
C. annulus Linnaeus, 1758.
C. asellus Linnaeus, 1758.
C. caputserpentis Linnaeus, 1758.
C. carneola Linnaeus, 1758.
C. cicercula Linnaeus, 1758.
C. histrio Gmelin, 1791.
C. isabella Linnaeus, 1758.
C. talpa Linnaeus, 1758.
Family: FASCIOLARIIDAE *Latirus craticulatus* (Linnaeus, 1758).
L. polygonus (Gmelin, 1791).
Peristernia forskalii (Tapparone-Canefri, 1875).
Family: MELAMPIDAE *Melampus* sp.
Family: MITRIDAE *Mitra fastigium* Reeve, 1845.
M. litterata Lamarck, 1811.
Family: MURICIDAE *Drupa ricinus* (Linnaeus, 1758).
Morula granulata (Duclos, 1832).
M. uva (Röding, 1798).
Nassa francolina (Bruguière, 1789).
Purpura panama (Röding, 1798).
Family: NASSARIIDAE *Bullia* sp..
Nassarius sp..
Family: NERITIDAE *Nerita albicilla* Linnaeus, 1758.
N. plicata Linnaeus, 1758.
N. polita Linnaeus, 1758.
N. textilis Gmelin, 1791.
Family: PERSONIDAE *Distorsio anus* (Linnaeus, 1758).
Family: PHASIANELLIDAE *Phasianella solida* (Born, 1778).
Family: RANELLIDAE *Cymatium mundum* (Gould, 1849).
C. vespaceum (Lamarck, 1822).
Family: STROMBIDAE *Lambis scorpius* (Linnaeus, 1758).
Strombus mutabilis Swainson, 1821.
Family: TROCHIDAE *Trochus radiatus* Gmelin, 1791.
Family: TURBINIDAE *Turbo argyrostomus* L., 1758.
Family: TURBINELLIDAE *Vasum ceramicum* (Linnaeus, 1758).

Acknowledgements

We would like to thank Mr. M. F. Keeley of Cousine Island for the opportunity to make this study, Mr. P. Hitchins and Ms. S. Le Maitre for making the visit to Cousine Island logistically possible.

NOTES

Reproduction in the Seychelles tiger chameleon *Calumma tigris*

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The Seychelles tiger chameleon (*Calumma tigris* (Kuhl, 1820)) is recorded from the islands of Mahe, Silhouette and Praslin. A series of specimens reputed to have originated in Zanzibar (British Museum (Natural History) R76.10.10.1-5) were presented by Captain J.E. Parish and are part of a set of specimens shipped from Zanzibar but without accurate provenance data.

Although there are notes on its distribution in a variety of publications there are no detailed accounts of the biology the species beyond a record of a gravid female (Honegger 1966), a female apparently both laying eggs and retaining eggs with well developed embryos (Bourgat & Domergue 1971) and a species of protist gut parasite (Modry *et al.*, 1997). These data and a clutch of eggs in the British Museum (BM(NH) R1905.4.25.6-10, collected on Mahe by M.L. Tonnet in 1905) were summarised by Cheke (1984) who cited a clutch size of 3-4 eggs. There is a more recent record of 4-6 eggs being laid in a 2-3cm deep nest in October, the eggs were reported to measure 6x13mm (Grimm 2000). The mode of reproduction in this species is of some significance as the taxonomic relationships of the different chameleon species are much disputed and reproduction has been used as a character. Hillenius (1959) considered the Seychelles species to relate to the African ovoviviparous species *Chamaeleo pumilus* and *C. bitaeniatus* but it is currently placed in the Madagascan genus *Calumma* (Klaver & Bohme 1986).

Recent observations provide further detail on reproduction in Seychelles chameleons. In 1996 a chameleon from Praslin was reprted to have laid eggs before dying (S. Le Maitre & P. Hitchins *pers. comm.*). In November 2000, 4 neonate chameleons were found emerging from the soil in a pot plant from La Misere, Mahe. Each hatchling was reported to measure 60mm in total length. The nest chamber was subsequnetly excavated, it measured 2cm diameter, 10cm deep and was flask shaped. 12 membranous eggs (all hatched) were found (Fig. 1), each egg measured approximately 15x10mm.

In December 2000 we found a juvenile chameleon at Jardin Marron, Silhouette. This measured 29mm snout-vent length and 70mm total length.

From these observations it would appear that the Seychelles chameleon is normally oviparous, with a clutch size of 3-12 eggs. Reproduction occurs in the wet season. The breeding seson may be more extended and ovoviviparity may also occur, although there is no definite evidence for this at present.

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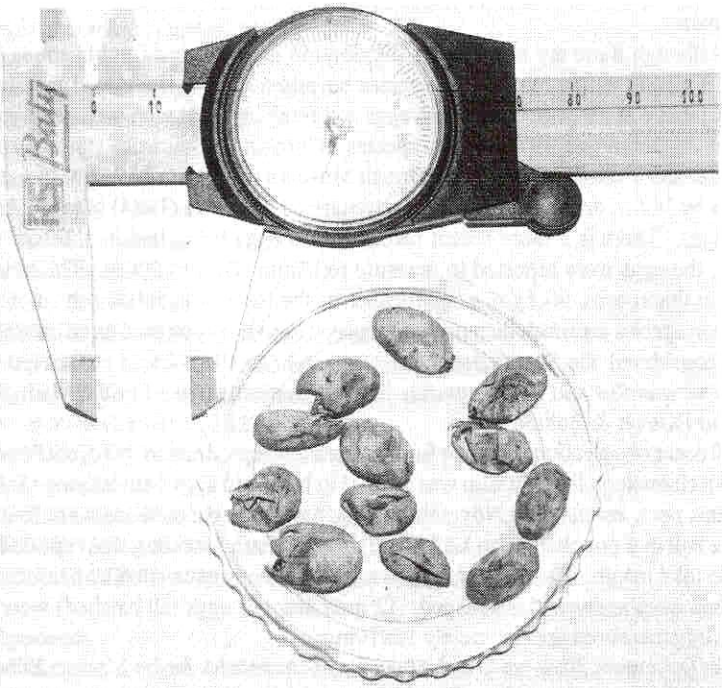
Fig. 1. Recently hatched clutch of *Calumna tigris* eggs.



An investigation of the invertebrate fauna on the Aride *Peponium* sp.

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The *Peponium* species (species status not yet confirmed) (Cucurbitaceae) present on Aride island is similar to *P. sublittorlae* which is endemic to Aldabra. It is possibly a Seychelles endemic subspecies of the African *P. vogelii* (Castle & Mileto 1994; Friedmann 1994). There are however morphological differences between it and the African species which has white or yellow flowers whereas the Aride *Peponium* flowers are solely yellow. The fruits of the African species ripen to red wheas the Aride plants turn brown. In Africa the plants are found from 80 to 240m in altitude wheras on Aride they are fond a few meters above sea level up to 134m. The plant found on Aride is currently identified as *P. vogelii* but not all taxonomists are in agreement with this (Friedmann 1994).

The Aride *Peponium* is a climbing creeper often going up into the canopy. Mature stems may grow up to 4cm in diameter. The weight of the plant is taken by supporting trees. Younger stems are green and fibrous. Leaves are ovate, base cordate 20cmx20cm 5-lobed and toothed at the margin. Older leaves are coarse to the touch. The petiole is curved, grooved up to 15cm long. Male flowers are green with 6 lanceolate lobes up to 5mm. It has 5 petals, which are yellow, obovate (broadest above the middle) and 4cm long. Female flowers are similar to the male but are always solitary with calyx (3cm) swollen at the base, peduncles are shorter than the male up to 10cm long. The flowers appear drooping and half closed during the day and at 5:30pm they open out fully and emit a pleasant fragrance, reminiscent of a primrose.

The fruit is hard and pale green when unripe, becoming ellipsoid, 6x4cm, brown, soft and dry when ripe. The seeds are ovate, flattened, dark grey, embedded in an orange gelatinous net in unripe fruit but dry and loose in dry fruit.

This study was carried out in an attempt to answer the following quesitons. Firstly, which invertebrates pollinate *Peponium* flowers? Secondly, which invertebrates live on the leaves? Thirdly, how are *Peponium* fruits dispersed and what makes use of them?

Species distriubtion

An all-island census was conduced in March to May 1999 (Crowley & Meegan 2000). At least 733 plants were located, compared to a previous total of 66 plants in March to May 1993 (Ayrton 1994). The 1999 study found 2 new sub-populations of plants. Highest densities were found to the west and south of the view point path on the west side of the island. They were mostly found where dense hill woodland was abundant though gaps created by fallen trees seemed important to allow young plants to climb and mature (Crowley & Meegan 2000).

Methods

3 *Peponium* sites were selected. One to the west of the lodge in the plateau area growing on *Morinda citrifolia* (GR 52223441). The second site was on the view point path with *Nephrolepis biserrata* as the supporting species (GR 51623445). The third site was on the plateau (GR 51733439) being supported by *M. citrifolia* and *Pisonia grandis*. The sites were studied during June to July 2000. All plants had both flowers and fruit present. Plants were observed for 30 minutes at a time. 20 randomly selected leaves were observed for invertebrates. 5 flowers were observed for any visiting invertebrates. New invertebrates were collected and preserved in 70% ethanol for identification. Invertebrates that had already been collected were subsequently noted only.

Results

Table 1 shows the species that were collected and identified at the 3 sites. Species observed visiting flowers were the small green and gold moth *Epicroesa* sp., the black and white moth *Diaphana indica* and a green aphid species. *D. indica* is an indigenous moth and was observed going from one flower to a second at 18:00hrs when the flowers were open. small 'sugar' ants *Monomorium floricola* were observed inside the *Peponium* flower.

Species observed on the fruit included coccoid scale insects, a 2-striped green caterpillar and the large ant *Camponotus grandidieri*. No fruit was found predated by skinks although skinks were ever present on the leaves.

Conclusion

The *Epicroesa* moth and the black and white moth *D. indica* were found at all 3 sites regardless of the type of supporting vegetation at each site. More drosophilid fruit flies were present near the lodge on the *Peponium* supported by *Morinda citrifolia*. *M. citrifolia* attracts many kinds of insects and was thought to influence those on the *Peponium* sp. It could be hypothesised that *Peponium* is pollinated by the *D. indica* as observations suggest. This moth was observed on the leaves throughout the day but was most active at dusk when the *Peponium* flowers opened.

Moorhens *Gallinula chloropus* have been observed feding on fallen *Peponium* fruit on the plateau and may also act as seed dispersers for this species.

Acknowledgements

I would like to thank Justin Gerlach for his identification of the invertebrates collected in this study. I would also like to thank John Bowler for his help and advice.

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Table 1. Invertebrates recorded on *Peponium*.
F = present on flower, Fr= present on fruit, a = abundant

Class	Species	Day from 25/6/2000																									
		Lodge										Viewpoint										West- end					
		1	2	3	4	5	8	10	10	11		1	2	3	5	6	8	8	9	10		10	11	11	12		
	Time (hrs)	16	11	10	11	11	14	15	18	11		18	18	16	14	15	15	18	11	18		14	12	14	17		
Hemiptera	*Osaka relata*	1	-	-	-	-	-	1	-	1		-	-	-	-	-	1	1	1	-		-	-	-	-		
	Bathycoelia praelongirostris	-	-	-	-	1	-	-	-	-		-	-	-	-	-	-	-	-	-		-	-	-	-		
	Fulgoroidea sp. (juv.)	1	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-		1	-	-	-		
	Coccoidea sp.	-	F	-	-	-	-	-	-	-		-	-	-	-	1	-	-	-	-		-	-	-	-		
	Aphididae sp.	-	-	-	-	-	1	-	-	-		-	-	-	-	-	-	-	-	-		3	-	-	-		
Coleoptera	*Chilocorus nigritus*	1	-	-	-	-	1	-	-	1		-	-	-	-	-	-	-	-	-		-	-	-	-		
Lepidoptera	*Epicroesa* sp.	2	1	F	-	-	-	1	-	-		1	-	-	1	1	1	a	a	1		-	1	1	1		
	Diaphana indica	-	-	-	-	-	-	-	-	-		1	F	-	1	1	-	1	1	1		-	1	1	1		
	Psara cf. *basalis*	-	-	-	-	-	-	-	-	-		-	1	-	-	-	-	-	-	-		-	-	1	-		
	Marasmia poeyalis	-	-	-	-	-	-	-	-	-		-	-	-	1	-	-	-	-	-		-	-	-	-		
	Lithocolletidae sp.	-	-	-	-	-	-	-	1	-		-	-	1	-	-	-	-	-	-		-	-	-	-		
	Tineidae sp.	-	-	-	-	-	-	-	-	-		-	-	-	1	-	-	-	-	-		-	-	-	-		
	larva sp. 1	-	-	-	1	-	-	-	-	-		-	-	-	-	-	-	-	-	-		-	-	-	-		
	larva sp. 2	-	-	-	-	1	-	1	-	1		1	-	1	-	1	-	-	a	-		3	-	Fr	-		
	larva sp. 3	-	-	-	-	-	-	-	-	-		1	-	-	-	-	-	-	-	-		-	-	-	-		
Diptera	*Melanostoma annulipes*	-	-	-	-	1	-	1	-	-		-	-	-	-	-	-	-	-	-		-	-	-	-		
	Calliphora 'luciola'	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-		1	-	-	-		
	Sarcophagidae sp.	1	-	-	-	1	1	1	-	1		-	-	-	-	-	-	-	-	-		-	-	-	-		
	Drosophilidae sp. 1	a	a	a	-	a	a	a	1	-		1	1	1	1	1	1	1	a	1		-	-	-	-		
	Drosophilidae sp. 2	1	-	1	F	-	-	-	-	-		-	-	-	-	-	-	-	-	-		-	-	-	-		
	Drosophilidae sp. 3	-	1	-	-	a	1	1	-	-		-	-	-	-	-	-	-	-	-		-	-	-	-		
	Pipunculidae sp.	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-		1	1	-	-		
Orthoptera	*Zarceus fallaciosus*	1	-	-	-	-	-	-	-	-		-	1	-	1	-	-	-	-	-		-	-	1	1		
Hymenoptera	*Camponotus grandidieri*	-	-	-	-	1	1	F	-	1		1	-	-	-	a	a	1	1	1		-	-	-	-		
	Technomyrmex albipes	-	-	-	-	-	-	-	-	-		1	1	-	a	a	1	F	1	aF		-	-	1	1		
	Monomorium floricola	-	-	-	-	-	-	-	-	-		F	-	-	F	-	-	-	-	-		F	-	F	-		
Aranceae	*Myrmarachne constrictus*	1	-	1	1	1	-	-	-	-		-	-	-	-	-	-	-	-	-		-	-	-	-		
	Nephila inaurata	-	-	-	-	-	-	-	-	-		2	1	-	2	-	-	-	-	-		1	-	-	-		
	Argyrodes cognatus	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-		1	-	-	-		
	Salticidae sp.	1	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-		-	-	-	-		
	sp. 1	-	-	-	-	1	-	1	-	-		-	-	-	-	-	1	-	-	-		-	-	-	-		
	sp. 2	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	1	-	1		-	-	-	-		
Acari	sp.	-	-	-	-	-	-	-	-	-		-	1	-	1	a	-	a	a	-		-	-	-	-		

NOTES

Euso - a new name for *Eusora* Saaristo, 1998 (Araneae: Ochyroceratidae)

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In a paper published recently (Saaristo 1998) I described a new ochyroceratid genus *Eusora*. Unfortunatelly I failed to notice that the name *Eusora* has been used earlier for a leafhopper genus (Oman 1949). Thus *Eusora* Saaristo, 1998 is a junior homonym of *Eusora* Oman, 1949 and must be rejected. Therefor a new name *Euso* is hereby proposed to replace *Eusora* Saaristo, 1998

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NOTES

A record of *Entada rheedii* Sprengel from Seychelles

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The first record of a sea bean *Entada rheedii* Sprengel (Mimosaceae) from Seychelles appears in Robertson (1989) but is a sight record only of a seed that had washed up on a beach on Praslin and was subsequently germinated artificially. There is no further mention

of the fate of the plant or if the seed was germinated only to confirm its viability. Given the distance from Madagascar and the provenance of many other species from that area, it is strange that this plant has not established itself naturally in Seychelles.

Seed pods of this climbing plant were seen by Charles Morel at Quincy Village on Mahe. With the pod, leaves and photographs of the flowers of the plant, it was identified from Robertson (1989) and from Friedmann (1994) who both cite the smae record from Praslin. The Botanical Gardens on Mahe have no known records of this species (D. Dogley pers. comm.).

Both authors inspected the plant on 6th June 2000 and confirmed that it is well established with a number of 5-10cm diameter stems. Its behaviour is identical to most alien invasive climbers and was heavily entangled with the alien *Antigonon leptopus* Hook. & Arn. and the indigenous *Merremia peltata* (L.) Merr.. The plant does not appear to be growing in a position that could have resulted from natural colonisation and it is assumed therefore to have been introduced. An appeal for records from the general public was made through the press.

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NOTES

The mayflies of Seychelles: morphology, distribution and ecology.

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In the Seychelles islands Ephemeroptera are represented by two mayfly species: *Hagenuloides braueri* (Ulmer, 1919) and *Maheathraulus scotti* (Eaton, 9193). Both are endemic monotypic genera belonging to the Leptophlebiidae. Their presence on the islands is a result of the Gondwanan biogeography of the islands; with the adults being short lived and relatively weak fliers they cannot have reached the islands by dispersal but are remnants of the ancient fauna of the islands. Very little is know of these species; adult morphology has been well described, as has the larva of *M. scotti*. Distributions have been recorded but there is little published data on behaviour and ecology.

Recent research on Silhouette island has located both species and provided data on habitat preferences and distribution. Existing and new data are reported below.

***Hagenuloides braueri* (Ulmer, 1919)**

Morphology

Male imago: Described by Ulmer (1919). Light grey in life with blue eyes. Body 7-8mm, fore wing 7.5-8.5mm.

Female imago: Not known to Ulmer (1919). Resembles male. Eyes grey in alcohol, blue-grey in life. Body colour light, white in alcohol. Body 6.0mm.

Nymph: Not known to Ulmer (1919). Antennae slightly longer than maximum length of head. Legs: claw 1 apically hooked, others robust and pad-like. Gills: gills on segments 1-7; all gills broad, plate-like. Paracercus shorter than cerci. Cerci and paracercus white, every 5th segment grey. Body 4.3mm; cerci 1.9mm.

Distribution

Mahé: widespread (recorded from Riviere du Cap, Rochon river, Desert river, Val Riche, Riviere St. Louis, Athanas river, Le Niol resevoir, G. Anse river, Cascade - Peters 1980)

Praslin: waterfall in the Vallee de Mai (Peters 1980)

Silhouette: Grande Barbe (pers. obs. and D. Simpson & A. Royo pers. comm.)

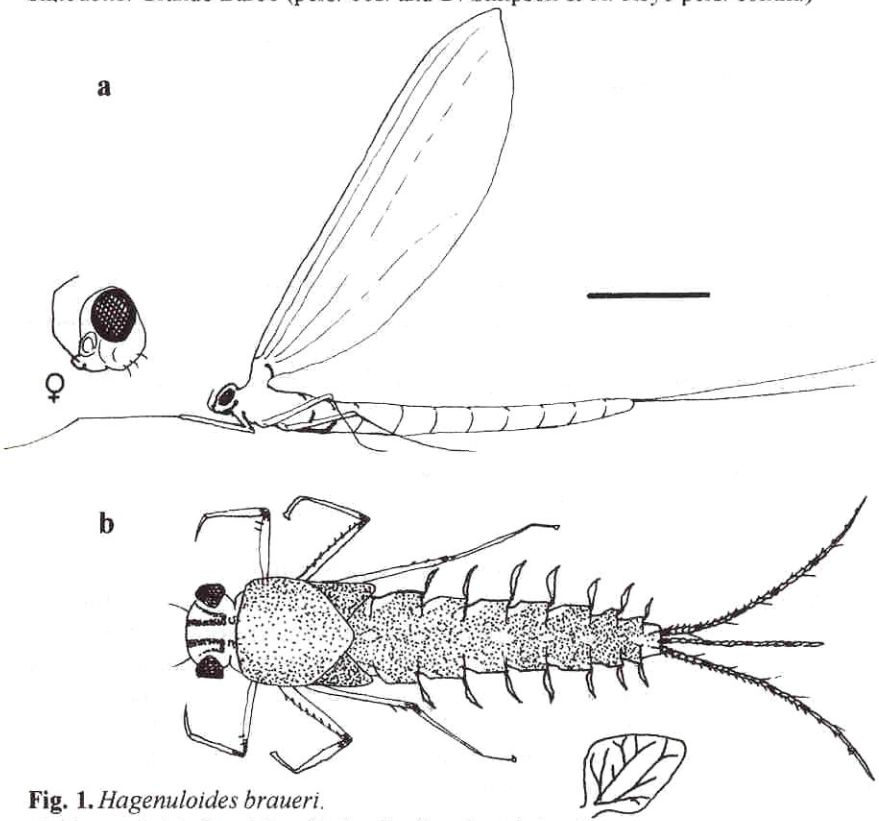

Fig. 1. *Hagenuloides braueri*.

a). Imago (adult female), with detail of head; scale bar 1mm.

b). Nymph, with detial of gill; scale bar 1.25mm

***Maheathraulus scotti* (Eaton, 1913)**

Morphology

Male imago: This has been well described by Peters & Edmunds (1964), additional to their description the upper portion of the eyes in live specimens is red, the lower portion very dark grey or black.

Female imago: Well described by Peters & Edmunds (1964).

Body: Female 3.3-3.4mm; male 3.4-3.8mm. Fore wings: female and male 3.8mm.

Nymph: Well described by Peters & Edmunds (1964), in addition the gills are black in life and dark brown maculations are present on the vertex. Body 3.4mm; cerci 3.1mm. Largest mature nymph (Riviere Macchabbe, Silhouette) 7.0mm long, cerci 8.9mm.

Distribution

Mahé: widespread from sea level to Morne Blanc and Mare aux Cochons (Eaton 1913; Peters 1980). The high altitude records were mostly "in a swampy hollow containing pools, long grass, wild palm-trees, &c." (Eaton 1913).

Praslin: Vallee de Mai (Peters 1980).

Silhouette: Grande Riviere, Riviere Macchabee (pers. obs.).

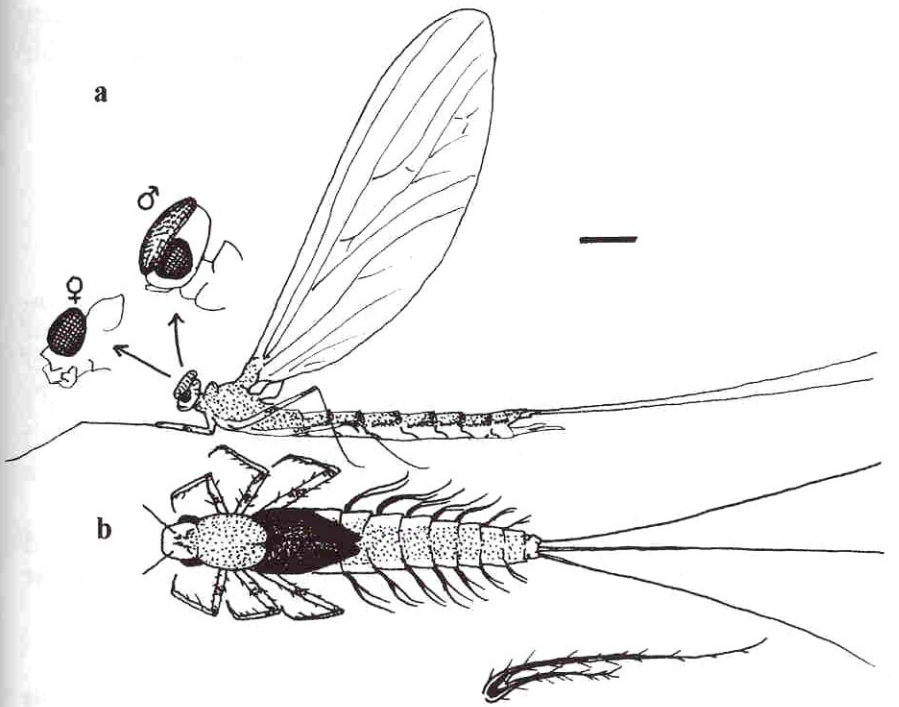

Fig. 1. *Maheathraulus scotti.*

a). Imago (adult female), with details of male and female heads; scale bar 1mm.

b). Nymph, with detail of gill; scale bar 1mm.

Ecology

H. braueri is principally associated with marshes and pools in slow flowing streams. *M. scotti* is present in fast flowing streams from sea level to the stream source. These differences are reflected in the streamlined morphology and grasping claws of *M. scotti*, compared to the heavier body and weaker grip of *H. braueri*. Nymphs of *M. scotti* are found under small rocks in streams, run over the surface of the rocks when lifted out of the water. They can be locally highly abundant.

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NOTES

Notes on the diet of sooglossid frogs

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There are few published references to the diet of any species of the Seychelles endemic frog family Sooglossidae (Brauer 1898; Mitchell & Altig 1983). The diet of *Sooglossus gardineri* has been studied based on a large number of preserved specimens. Collection of new material to determine the diet of the other species is not ethical and only isolated records can be made. The available data are reported below based on published material and specimens in the collection of The Nature Protection Trust of Seychelles (NPTS).

Nesomantis thomassetti Boulenger, 1911

The stomach of one dissected Silhouette specimen (NPTS Ca2000.2) contained insects (one Lepidoptera larva, two Fulgoroidea nymphs, one Curculionidae), one spider (*Nephila inaurata* juvenile) and one woodlouse (pers. obs.).

Sooglossus seychellensis (Boettger, 1896)

Of two dissected Silhouette specimens (NPTS Ca2000.3) one contained a beetle larva and a soldier termite (*Nasuitiermes nigritus*), the other a neriidid fly (*Chaetonerius alluaudi*). A faecal sample from one Silhouette adult male contained 12 Lepidoptera larvae. Termites and beetles have previously been recorded from *S. sechellensis* stomachs from Mahé (Brauer 1898), these presumably include the apparent lectotype in the University of Marburg (L3.38/Amph.34).

Sooglossus gardineri (Boulenger, 1909)

Diet was studied from 186 dissected Mahé specimens (Mitchell & Altig 1983). Main dietary items comprised sciarid fly larvae (40.6%), ants (22.0%) and mites (18%).

Sooglossus sp.

In captivity this undescribed Silhouette species eats termites (*Nasutitermes nigritus*), only small individuals were eaten. It is probable that in the wild small invertebrates such as mites and Collembola are consumed.

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NOTES

New records for some vertebrates in Seychelles

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The last overview of the vertebrate fauna of Seychelles with distribution records was in the relevant chapters of Stoddart (1984). Since then, the birds in particular have continued to draw attention (e.g. Skerrett *et al.* 2001), and the Netherlands Indian Ocean Programme has added to our knowledge of the distribution of fishes in Seychellois waters (Egmond & Randall 1994), but there have been relatively few new distribution records for other groups. The following are records collected over the past year based on personal observations and on animals found by others and identified by me.

Satyrichthys sp. (Order Scorpaeniformes: Family Peristediidae)

Fishes of the family Peristediidae, commonly known as armoured searobins or armoured gurnards, have not been reported from the waters around Seychelles up to now. Smith & Smith (1963) listed "*Peristedion*" *adeni*, now treated as *Satyrichthys adeni* (Lloyd, 1907) as one of the species "not yet found at Seychelles but likely to be there". Polunin (1984) did not include any member of the family in his list of additions to the known Seychellois fish fauna; and none was reported by Egmond & Randall (1994) in their report on the fish collected by the Netherlands Indian Ocean Programme in 1992-1993.

On 28th February 2001, while fishing on the Correira Bank at 57° 09.189 East and 06° 29.726 South, Noël Jumeau caught a specimen of *Elops saurus* Linnaeus,

1877 ("somon" in Seychellois Creole) at a depth of 118 metres using a drop line (Jumeau pers. comm.). Inside the stomach of the fish he found several specimens of what I have identified (based on the descriptions and figures in Froese & Pauly (2001)) as a species belonging to the genus *Satyrichthys*, which has a well-developed preopercular spine as one of its diagnostic features. It is obviously not *S. adeni*, having longer bony processes on the upper jaw than that species. Superficially, it resembles *S. rieffeli* (Kaup, 1859) from where the Indian and Pacific Oceans meet between northern Australia and Indonesia (Russel & Houston 1989) and *S. engyceros* (Günther, 1872) from around Japan and Hawaii (Masuda *et al.* 1984). The two specimens shown to me measured 12.5cm and 15.5cm respectively in total length (from tip of bony process to tip of caudal fin).

Hippocampus histrix Kaup, 1856 (Order Syngnathiformes: Family Syngnathidae)

Smith & Smith (1963) included *Hippocampus kuda* Bleeker, 1852 in their list of fishes likely to be found in Seychelles. Smith (1968) wrote: "Though the Seychelles are in such warm seas, no seahorses have ever been found there; we could not find them there either..." Polunin (1984) did not include any Seychelles record for the group. During the Netherlands Indian Ocean Programme in 1992-1993 seahorses were discovered in the outer, coralline, islands: *H. histrix* was found to the south-east of Bird Island, and *H. whitei* Bleeker, 1855 and an unidentified species *H.* sp. were collected to the west of Poivre (Egmond & Randall 1994; Randall & Egmond 1994). *H. histrix*, the "thorny seahorse", is now known to occur around the granitic islands of Seychelles as well. On 27th January 2001 Guy Esparon caught a specimen (8.2cm in length), identified by me (after Froese & Pauly 2001 and Randall & Egmond 1994) as belonging to this species, in a fishtrap off Anse Royale on the east coast of Mahé (Matyot 2001). On 11th July 2001 I found a considerably smaller (3.1cm) specimen, of *H. histrix* under a *Pisonia grandis* tree on Île aux Récifs. It was still fresh and lay near other fish, such as flyingfish (Order Beloniformes, Family Exocoetidae), that had been dropped by lesser noddies *Anous tenuirostris tenuirostris* and white terns *Gygas alba monte* nesting in the tree. There were also pieces of the sea grass *Thalassodendron ciliatum* that had been dropped by lesser noddies. It is not known if the seahorse had been caught alive as prey or whether it had been picked up already dead by a lesser noddy that had mistaken it for a piece of sea grass that could be used as nesting material.

Hemidactylus mercatorius Gray, 1842 (Order Squamata: Family Gekkonidae)

Cheke (1984) was the first to point out that a specimen of "*Hemidactylus mabouia*" collected on Mahé during the first Percy Sladen Trust Expedition in 1905 (Boulenger 1909) was actually *H. mercatorius*. He also noted that there had not been any recent records of the species on Mahé, although the species was known to occur in the outer, coralline islands and it has been suggested that the specimen may have been collected on one of the outer islands (R. Nussbaum pers. comm.).

It is now clear that *H. mercatorius* is present on Mahé. I first noticed a gecko that was very different from the common *Gehyra mutilata* Wiegmann, 1835 on sev-

eral occasions near a light at night at the television station of the Seychelles Broadcasting Corporation (SBC) at Hermitage in 1995 (exact dates not recorded). It had tubercles on the body, suggesting that it could be a *Hemidactylus*, but the identity could not be confirmed because the animal was very shy and immediately withdrew into a hole in the ceiling every time I tried to approach it. At the beginning of March 1997 SBC staff at the radio station at Union Vale discovered a spider, which I subsequently identified from a photograph as *Rhitymna valida* (Blackwall, 1877) (Family Heteropodidae), feeding on a gecko on the trunk of a palm tree (Anon. 1997). From the photograph it was obvious that the gecko belonged to the genus *Hemidactylus*, but a more precise identification was again not possible. On 11th April 2001 Bérard Hoareau caught a gecko, a gravid female, in a store at the headquarters of the Seychelles Public Transport Corporation (SPTC) at the New Port in Victoria and I identified his catch as *H. mercatorius* on thebasis of the combination of distinctive dorsal tubercles, divided toe pads and regular pattern of W-shaped dark bars down the back. A week later I captured another *H. mercatorius* in a toilet at the SBC TV station at Hermitage. This individual was later released at the same site and its behaviour observed on several occasions. Unlike *G. mutilata*, it frequently climbs down walls and ventures on the ground but is much more shy, scurrying away into holes and cracks at the slightest disturbance, which may account for the lack of recent observations noted by Cheke (1984). In captivity *H. mercatorius* feeds readily on small moths belonging to the family Pyralidae, on the cockroach *Pycnoscelus indicus* (Fabricius, 1775), winged termites (Order Isoptera) and the bush cricket *Conocephalus iris* Serville, 1838. Prey items are almost invariably swallowed head first.

Gehyra mutilata Wiegmann, 1835 (Order Squamata: Family Gekkonidae)

The skink *Mabuya sechellensis* is the only lizard that has been previously reported from the small granitic island of Île aux Récifs between Mahé and Frégate (Vesey-Fitzgerald 1948; Nussbaum & Brodie, unpublished). I found a single specimen of *G.mutilata* on a wall inside the deserted building there on 10th July 2001. The building is used as a "camp" by visiting wildlife rangers.

Ramphotyphlops braminus Daudin, 1803 (Order Squamata, Family Typhlopidae)

R. braminus is also to be added to the herpetofaunal list for the island of Île aux Récifs. On 13th July 2001 I found a specimen there under a stone at the top of the south-facing slope of the hill where sooty terns *Sterna fuscata*, brown noddies *Anous stolidus* and bridled terns *Sterna anaethetus* nest.

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NOTES

A first Seychelles record of the ghost-pipefish *Solenostomus cyanopterus*

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The ghost-pipefish *Solenostomus cyanopterus* (Bleeker, 1854) (Syngnathidae) is widely distributed in the Indo-Pacific, with western Indian Ocean records from Zanzibar,the comores, Madagascar and Mauritius (and was inlcuded in a list of species expected to occur in Seychelles waters by Smith & Smith (1963). There are no published records of this species from Seychelles.

On 4th July 1985 two ghost-pipefish were found in *Sargassum* weed growing at the base of a boulder on the reef flat at Mare Angalise, Mahe. One was an adult female (total length 105mm) and the other an adult male (114mm) with eggs in its brood pouch. These individuals were identified by Dr. Alwyne Wheeler of the British Museum (Natural History) as *Solenostomus cyanopterus* although the colouration of both individuals differed from descriptions, being light green with black spots and brown fins, and with bright blue ocelli on the dorsal fins (rather than brown with black ocelli). On 10th July 1986 a juvenile (51mm) was found in the same habitat and locality. This individual was the more typical dark brown, but with green ocelli.

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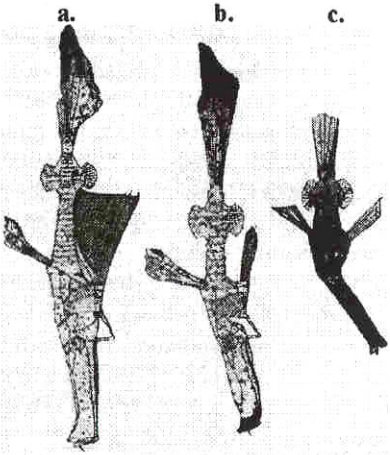

Fig 1. *Solenostomus cyanopterus* from Mahe (drawn from life)
a). male (1985)
b). female (1985)
c). juvenile (1986)

NOTES

On *Edentulina moreleti*, the first herbivorous streptaxid (Gastropoda)

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Several distinctive Streptaxidae have been described from Seychelles (Gerlach & Bruggen 1999), some taxa closely resemble African genera, although there is some doubt as to their true generic placement (Gerlach & Bruggen 1999). *Edentulina* is the largest and most conspicuous of these genera. One species, *E. dussumieri* (Dufo, 1840) is the most abundant streptaxid in the islands (pers. obs.) but the other Seychelles member of the genus, *E. moreleti* (Adams, 1868), is known from only 4 collections, comprising 34 specimens (Gerlach & Bruggen 1999).

The species was originally described from one specimen from Silhouette island (as *Gibbus (Gibbulina) Moreleti*) without any record of precise locality or habitat (Adams 1868). Subsequent records refer to the holotype (Pfeiffer 1941; Nevill 1868; Martens 1880). Seven specimens were collected by A. Brauer in 1894 on Mahé (Copolia, Mare aux Cochons, Morne Blanc, Morne Seychellois), one by G. Lionnet in the 1960s (Mahé: Congo Rouge) and 12 by Van Mol & Benoit in 1972 (Silhouette: Mare aux Cochons) (Gerlach & Bruggen 1999). Brauer's specimens were reported to be found "under damp leaves on the ground" (Martens 1898), none of the other specimens have associated micro-habitat data although it

has been reported that the Congo Rouge specimen may have been arboreal (G. Lionnet pers. comm.). Repeated searches on Mahé and Silhouette in 1986-1999 failed to locate any specimens, despite careful searches of all the above sites. In July 2000 a population was found at Mon Plaisir, Silhouette. Eight specimens were collected from Mon Plaisir, all from the axils of *Dracaena reflexa* plants. These comprised one adult, one subadult and six juveniles. Five *D. reflexa* were studied in the mist forest, *E. moreleti* were found in four of the plants, all from the highest altitude. These data provide a preliminary estimate of population densities, with two snails per axil and an mean number of axils per plant of three (range 1-4, s.d 0.9) at the occupied altitudes, giving six per plant. *D. reflexa* occurs at 80 plants per hectare in this site. *E. moreleti* was not found in plants below 540m and *D. reflexa* was not found above 600m, the area bounded by these limits covers two hectares, giving a population at the site of approximately 160 individuals. It appears that this species is found in high humidity sites with a high abundance of *D. reflexa*. This is conspicuous at Mon Plaisir and in areas around Mare aux Cochons. Other small sites may also support this micro-habitat.

The new material allows the descriptions to be expanded. The body has been described as being red in life (Martens 1898). Neonatal snails are yellow, juveniles yellow with crimson tentacles, this crimson colour spreads over the body with age but darkens to brown in the subadult, becoming dark brown in the adult snail. The shell is colourless in juveniles, the periostracum thickening and tanning brown in the subadult and adult. The snails collected at Mon Plaisir were kept alive and their diet and reproduction studied. They were maintained in a plastic box with damp paper towel on the base. Temperatures and humidity were not controlled but varied in the ranges of 18-24°C and 80-100% respectively, ranges which approximate those recorded at Mon Plaisir (pers. obs.).

The radula has characteristically broad teeth (Gerlach & Bruggen 1999), although the shape of the teeth has not been commented on previously, it is notable that their shape is in marked contrast to those of other streptaxids. The broad shape appears similar to those of herbivorous snails more than carnivorous taxa, and may be adapted to scraping rather than predation. In captivity the snails were offered a free choice of plant material (carrot, apple, green leaves) and small snails. No snails were eaten during a one month period but all age groups of *E. moreleti* were observed feeding on carrot, apple and decaying leaves. From these observations it can be concluded that *E. moreleti* is herbivorous, in the wild it probably feeds on the algae and decomposing vegetation trapped in the axils of the *D. reflexa* plants.

The presence of a brood chamber at the base of the spermoviduct has been noted previously (Gerlach & Bruggen 1999). Over the course of 1 month the captive adult gave birth twice. On both occasions single neonates were produced, confirming that *E. moreleti* is ovo-viviparous.

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